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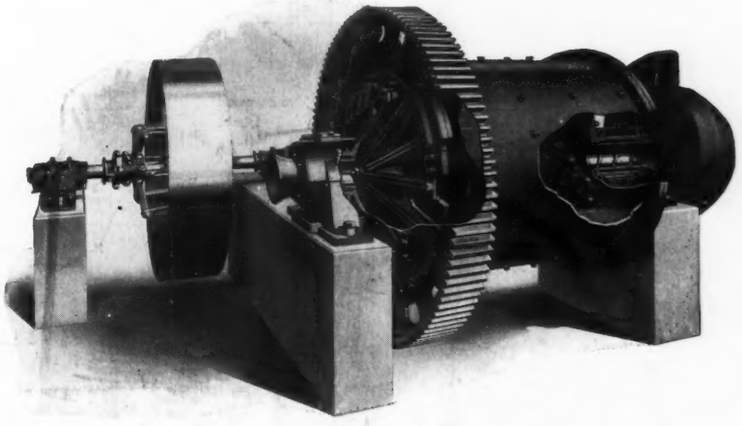

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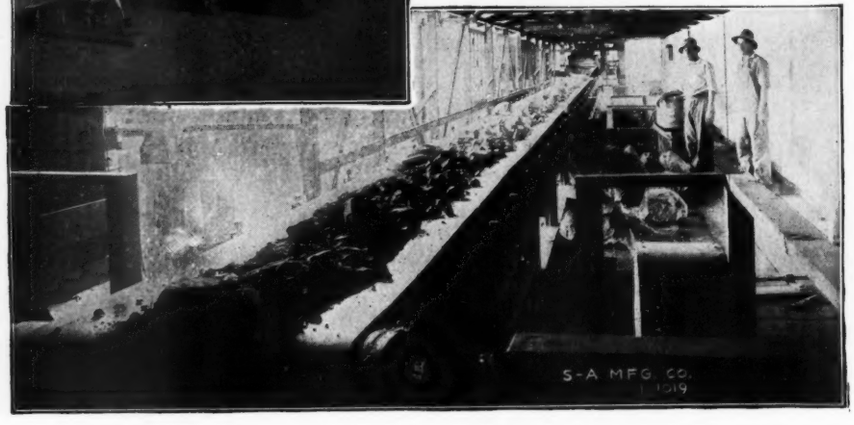

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Drift Mining in California

BY J. D. HUBBARD*

Decadence of mining in the lava-covered Tertiary gravels of California is due to lack of enterprise in applying modern methods and machinery. Extensive deposits of low-grade gravels await development. The varied working conditions are discussed, and the application of more advanced methods is advocated. Some average working costs are given.

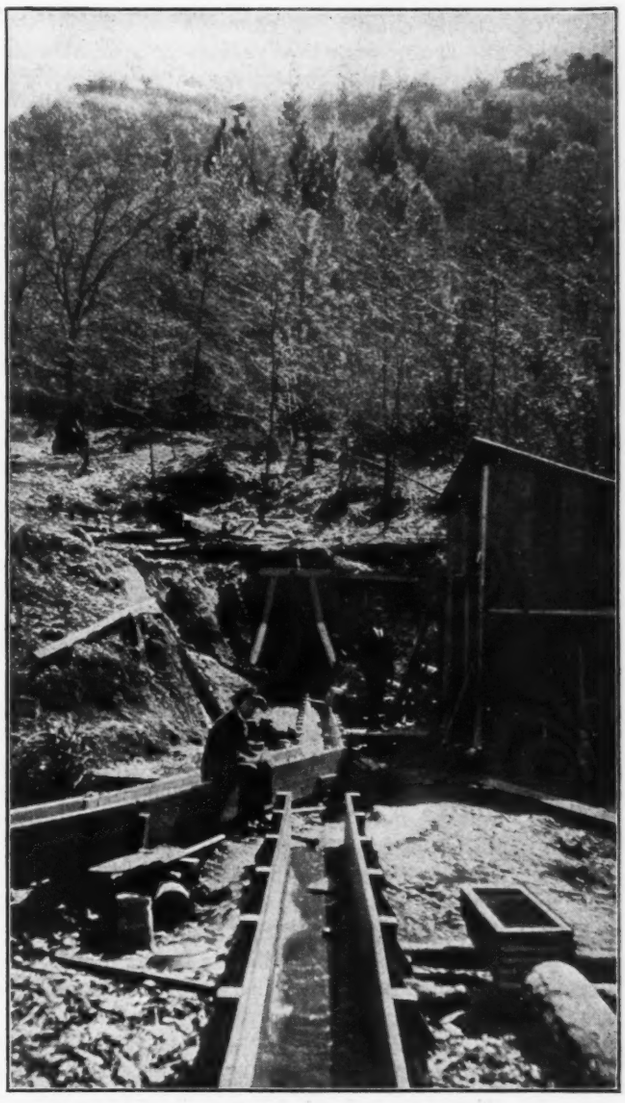
MINING of the lava-covered gold-bearing gravels in California was not affected by the passage of the Anti-Débris Law, which threw hundreds of hydraulic miners out of work. Nevertheless, there has been a gradual decline in drift mining. Only the richest and most accessible of the lava-buried gravels have been exploited and these by methods often crude and wasteful. About three hundred miles of ancient-river channels have been worked out with an average production of nearly a million dollars in gold per mile. As natural conditions became more difficult and the lack of modern equipment more acutely felt, this class of mining declined to a degree that has hardly been overcome to date.

That drift mining presented strong attraction to the mining man is obvious, for it afforded many opportunities for rich "strikes." The chance of a "find," however, has little place in modern business practice. The main thing now is to adopt modern and efficient methods and to calculate profit from the "run-of-mine" gravel, discounting strikes and regarding them merely as velvet. In this day of drilling and mucking machines and improved metallurgy, drift mines deserve more attention.

The drift mines of the state have an excellent record of production. In this connection I will refer to Waldemar Lindgren's report[1] on the "Tertiary Gravels of the Sierra Nevada of California," in which the following appears:

> As shown in detail in the following tables, the counties of the Sierra Nevada north of and including Mariposa have produced approximately $57,500,000 in placer gold during the period (1897-1909) for which accurate statistics are available. Of this not more than $15,000,000 came from the gravels of the pre-Tertiary channels. What the total production may have been is impossible to estimate, for the reason that in the earlier years the yield of the placers was not subdivided according to source. The total output of gold in California is estimated at $1,200,000,000 to $1,500,000,000, but about one-fifth of it was derived from quartz veins. The great bulk of this came from the Quaternary deposits, and about $300,000,000 is a conservative estimate for the amount obtained from the Tertiary gravels.

I direct attention to the last sentence, which is significant. The Tertiary or Neocene gravels make up the ancient-river beds of California, which still have three thousand miles or more of unworked channels.



MINERAL SLIDE DRIFT MINE, PARADISE, CALIF.

The formation of the ancient-river beds was the result of a great period of erosion. The contour line

*Formerly manager of the Lucky John mine, Paradise, Calif.; now general superintendent for the Holden Mining and Milling Co., Tuscarora, Nev.

[1]Professional Paper 73, U. S. Geol. Surv., Washington, D. C.

of that period was just the reverse of what it is at present, for the lava-capped channels are now the ridge tops, while in that past age they were the bottoms of the ravines or rivers in which the gold was concentrated. The Sierra Nevada, during this period, was a range with comparatively low relief. The drainage system during the Neocene era had its sources near the modern crest of the range, but the channels did not coincide with those of the present. Erosion gradually decreased in intensity, and auriferous gravels accumulated in the lower reaches of these Neocene rivers, the gold being derived from the eroded croppings of the veins. During the latter part of the Neocene period, volcanic activity, long dormant, began again. When the lavas burst forth they flowed down the river channels. The earlier flows were not sufficient to fill the streams and became interbedded with gravels. They are now represented by layers of rhyolite, andesite and rhyolite tuffs, sometimes altered to pipe clay. The later andesite and basalt eruptions were of great volume and, for the most part, completely choked the channels into which they flowed. The rivers were thus obliged to seek new outlets—substantially those in which they now flow.

Working Conditions and Methods

Mines are seldom alike, and a study of each must be made in order to work it in the best manner possible. The drift mines vary greatly. In some places the gravel is shallow and in others deep. The bedrock also varies considerably, but the ancient rivers were formed in a country of low relief and are less broken up and generally wider than the present streams. Some of the ancient streams were deeply cut, almost to the present base line, and deposits in these have to be worked through shafts, but by far the larger number of the channel deposits can be worked through tunnels and by gravity methods.

The prospecting work always aims to find the center of the stream bed and its lowest point. A main tunnel should then be driven on a working grade as close to the center line of the stream bed as possible. Crosscuts to the "rim" or shore line on either side at right angles to the main tunnel may be driven, 50, 100 or 200 ft. apart, to develop the gravel and find the extent of the "pay" laterally. Then, as shown in Fig. 1, the gravel can be stoped out from the rim side, working toward the center. A solid pillar of gravel should be left to protect the main tunnel, and when the channel has been worked out, this pillar may be removed, as shown in Fig. 2, by starting at the far end of the property and working toward the mouth of the tunnel. As one rim or the other is often exposed on the side hill, the crosscuts may be driven through to daylight, affording extra exits and better ventilation to the mine. The larger rocks may be thrown back for filling and so require one handling only.

Care must be taken in blasting not to throw the gravel on the rock pile. A little experience teaches the miner the right amount of powder to use to "kick" the ground just enough to cause it to roll from the face. It has been my experience that it is an excellent plan to pick men that really understand dynamite and have them do the shooting exclusively, paying them a little more money for the exercise of this superior skill. The same rule applies in other branches of the work and the practice is an economy in the end. Where a man displays aptitude along any particular line, even on the "muck-stick," it is profitable to give him higher pay—particularly in the case of American labor.

Where "low-ground" is found and the lava cap is not too far from bedrock, heavy T-sets, as shown in Fig. 3, may be used to good advantage. When the gravel bed is thicker, cribs or "cogs" of timber can be set up, as shown in Fig. 4. The cribs should be filled with rocks or boulders and when full are of great strength, second only to a solid pillar. In all cases the larger rocks and boulders may be thrown back for walls and filling. Where the gravel is still deeper, as shown in Fig. 5, methods of timbering or filling must be used to suit the

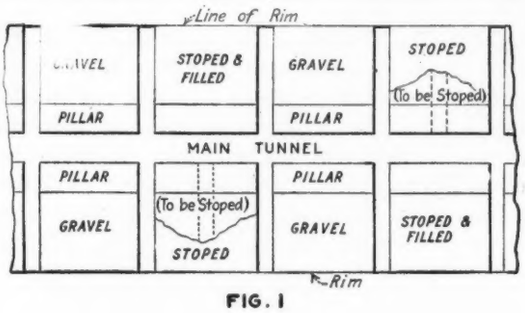


FIG. 1

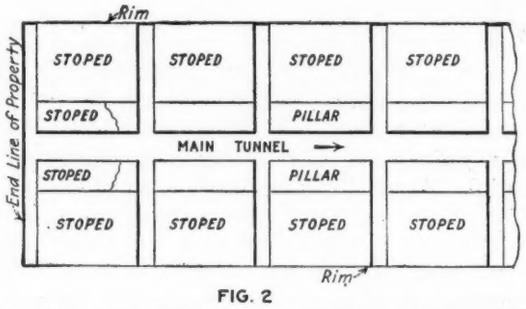


FIG. 2

METHOD OF STOPING IN CALIFORNIA DRIFT MINES

Fig. 1 shows stoping from the rim side toward the center of the deposit, leaving pillars to protect tunnel. Fig. 2 shows method of removing pillars from end of property toward mouth of tunnel

case. Often a caving system, working from the rim toward the center, is best.

Machine drills and mucking machines should be used wherever possible, for they will greatly reduce the cost of mining under certain conditions. The old methods of hand-moiling are obsolete, besides being wasteful of powder. I consider the decadence of drift mining due more to the persistence of hand-moiling methods than to any other cause. To make drift mining successful is just a matter of keeping up with the times, and drift miners seem to have been asleep in this regard. Heavy machines are not required in most gravels, the one-man type, such as the mountable plugger machines, being best. More gravel can be broken with a given amount of powder in a machine hole than in a moil hole, which becomes funnel-shaped and therefore does not confine the powder as it should. Where there is plenty of water and sluice-grade methods may be used underground to get rid of the muck, operating cost may be greatly reduced. It takes work to get a drift mine or any other mine in shape, but once opened properly it becomes a first cousin to the check book, to be drawn on at will up to the limit of the account.

It is remarkable how much ground was worked out by the oldtimers before powder was used. The method then

was to pick and gad out close to bedrock and then break down to the cut. The best miner was the one who could practically put his right hand in his left-hand pants pocket, for he had to lie on his side while working his cut. Only the better grade of ground could be worked that way. Nowadays it is not uncommon for one man with a good machine to break down 50 cu.yd. of gravel in his shift. The method of working must be carefully considered for each mine and the system best adapted under the conditions selected.

The costs of drift mining vary from 60c. per cu.yd. under favorable conditions and where sluicing can be done, to $4 per cu.yd. where a shaft is necessary and hoisting and pumping are items of cost. Where a good-sized channel occurs and gravity workings are possible,

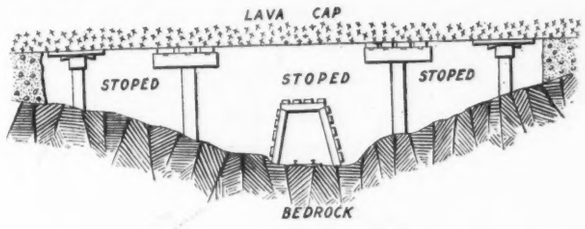


FIG. 3

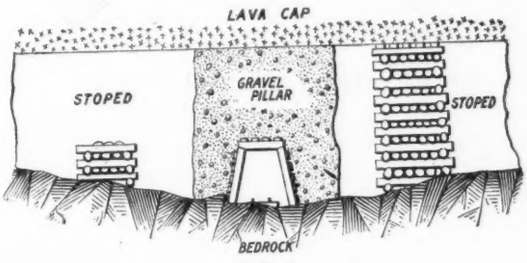


FIG. 4

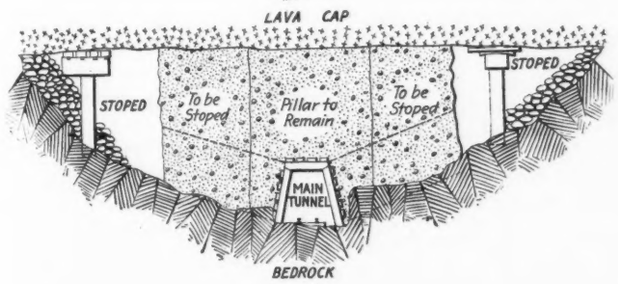


FIG. 5

TIMBERING IN CALIFORNIA DRIFT MINES

Fig. 3 shows use of T-sets when lava capping is not too far from bedrock. Fig. 4 shows use of cribs where gravel bed is thicker. Deeper gravel beds such as in Fig. 5 require methods of timbering or filling

by operating on a large scale the costs should not exceed $1 per yd. when prices for material are normal. Labor is the greatest cost in nearly all cases, and mucking the largest item, except where mucking machines can be used to advantage. The items of timbering, filling, power, water, powder and supplies, overhead, and the unexpected, must be carefully considered. Depreciation is generally low in drift mining, as only the simplest kind of plant is required.

The source of supply and cost of water should be given particular attention, as water is absolutely necessary to this class of mining. The time-honored plan is to appropriate water from a neighboring stream and bring it to the required point at the mine by ditch and flume. The first cost of the ditch and flume, even with labor at normal figures, is always a big item, as the ditch, on account of the necessary grade, is seldom less than a mile long. The water must arrive at the tunnel mouth with sufficient head to be effective. Where a ditch is practicable and the conditions are right it should be built, for it will run without gasoline. I wish to emphasize, however, the practicability of pumping water by power. Few realize the low first cost of good pumps, their mobility and dependability. A pump and an electric motor, for delivery of 300 gal. per min. (about 34 miner's inches) under 500 ft. head, will cost, say, $2500. The cost for power and upkeep should not exceed $10 per day for 16 hours work. And there is generally a stream nearby with sufficient water.

Drift mines generally make more water as the ground is developed. In some cases there is an abundance of water, sufficient for sluicing operations, and when these conditions exist the cost of water is practically nil.

Timber Requirements Variable

Timbering is an uncertain item. In many drift mines considerable timber must be used and in others only a small quantity, but all need some. Where a bedrock tunnel is run in fairly good ground little timber is needed. Only when stoping commences will it be used in any large amount, and then it will depend entirely on the character of ground worked. In the Hidden Treasure drift mine in Placer County, from 1,500,000 to 2,000,000 ft., b.m., of timber was used underground each year. In the Mineral Slide drift mine, in Butte County, not over 5000 ft. per year went underground. It depends on the mine, and what is under your hat.

In the following estimate of working costs, labor and supplies are at normal prices, the usual slate bedrock and the gravel of ordinary compactness—not cemented. In mentioning "cement" let me state that I have found

COST OF DRIFT GRAVEL MINING

	Stoping[1] Per Cu.Yd.	Drifting[2] Per Ft.	Tunneling[3] Per Ft.
Drilling	$0.14	$0.35	$0.70
Mucking and tramming	.26	1.00	.80
Powder, caps and fuse	.33	1.65	1.85
Power	.03	....	.30
Timber and filling	.06	....	....
Tools and sharpening	.02	....	....
Superintendence	.03	....	....
Lights and miscellaneous	.04	.46a	.26b
Depreciation	.02	....	....
Total	$0.93	$3.46	$3.91

[1] Breast at least 30 ft. wide and output 500 cu.yd. per day. Supplies and labor, $3 to $4 per shift, at normal costs and all material delivered to the sluices.
[2] Drifting in gravel; 6x7-ft. cut; same conditions and methods.
[3] Averaging 5 ft. per shift in slate bedrock; 6x7-ft. tunnel; same conditions. No timber costs allowed, as drift stands without timber. If it had been necessary to use timber the additional cost would not exceed $1 per ft.
a Costs include power, track and ties, miscellaneous.
b Costs include track and ties, miscellaneous.

it to be the great "bugaboo" of drift mining. What cemented material there is forms a very small part of the whole and I have known several drift mines that prepared to work this much feared "cement" by erecting mills and crushing devices which afterward did not turn a wheel. In the accompanying table of costs, one-man machine drills are used and in the remainder of the work ordinary hand methods. If mucking machines can be used, or sluicing, or electric haulage, shoveling and transportation costs may be much reduced. It will be noted that the cost of powder per foot or cubic yard is the largest item. This cost is practically a fixed charge and takes no account of the size of the operations.

The washing plant is a factor in drift mining that for low first cost and cheapness of operation cannot be beat. In many cases the simplest system of riffles may be used. It is well to give two or three drops of a few

feet each to the material to be washed, taking out the coarser material with grizzlies at each drop. This helps to disintegrate the mass and thereby free the gold. Different sluice grades are used, decreasing as the material gets finer. There is no advantage in a multiplicity of riffles. Pole and Hungarian riffles fit all cases. The fine material containing the black sands and fine gold is discharged into a tank with taper bottom where the sands are settled and the surplus water is allowed to run to waste. The thickened sands are then fed to a concentrator, preferably of the end-shake type which finally collects the gold. In Fig. 6 a typical gravel washing plant is shown. The concentrator is an important part of the plant and allows considerable latitude in the matter of the regulation of grade and water, which have to be particularly watched when the sluices are depended on to make the whole saving.

By neglecting the use of concentrators in the past large amounts of gold, platinum, and valuable byproducts have been lost. I have found the following minerals and metals in the drift gravel sands of California: Platinum, chromite, osmium-iridium, ilimenite, spinel, zircon, epidote, magnetite, garnet, tourmaline, pyroxine, monazite, amphibole, rutile, olivine, corundum and small diamonds and sapphires. Often these minerals are of sufficient quantity to warrant reclamation. The black sands of the Klamath Mountains and Butte County usually contain a considerable amount of chromite, and it will be a simple matter to save this valuable material by the use of a good type of magnetic separator. Nearly all the chromiferous serpentine areas in this state have sufficient chromite to make the recovery worth while. The percentage of black sand in the ancient channels varies from 1% to 3 or 4%, but rarely over 4%. So one concentrating table is generally sufficient for each plant, unless a large tonnage is worked.

In case tightly packed or slightly cemented material occurs in the mine, a different plant becomes necessary. This, however, is the exception. In Fig. 7 I show the flow sheet of a good type of plant to treat the more refractory material. Owing to the favorable conditions—slightly greater fall, ample water, and a natural classification—the gravels of California have an advantage over those of many other districts, as the bulk of the fine material which causes cementing and hardening has been washed away in the making of the channels.

In favorable places in these ancient channels there is a concentration of gold, and when one of these spots is found it is Fourth-of-July every day for a while. In the old Perschbaker drift, near Magalia, it is a tradition that the shovelers often picked up from $80 to $100 in a good shovelful of "dirt" from one of these favored spots. Many large nuggets have been found. It is characteristic of the ancient-channel gold that its average fineness is greater than the gold of later concentrations. In the Mineral Slide and Lucky John drift mines, in Butte County, gold running $19.85 per oz. in its natural state has been found, and, so far as I know, this was the finest mined in the state.

The importance of a decided change from old-time methods in drift mining is so great that it is difficult to put sufficient emphasis on it. The pumps and machine drills of today are so far superior to the old types that comparisons are indeed odious. With careful and intelligent exploitation—fair terms between owner and operator and a modern system of operation—California drift mines could again operate extensively, and be placed upon a profitable basis.

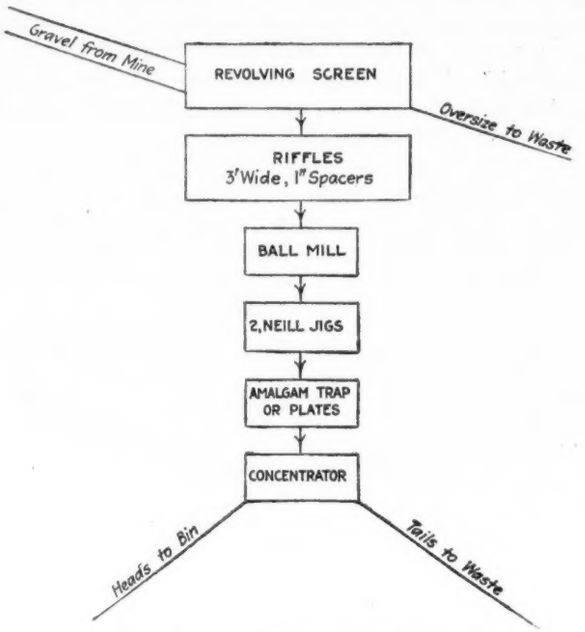


FIG. 7. TYPICAL MILL FLOW SHEET

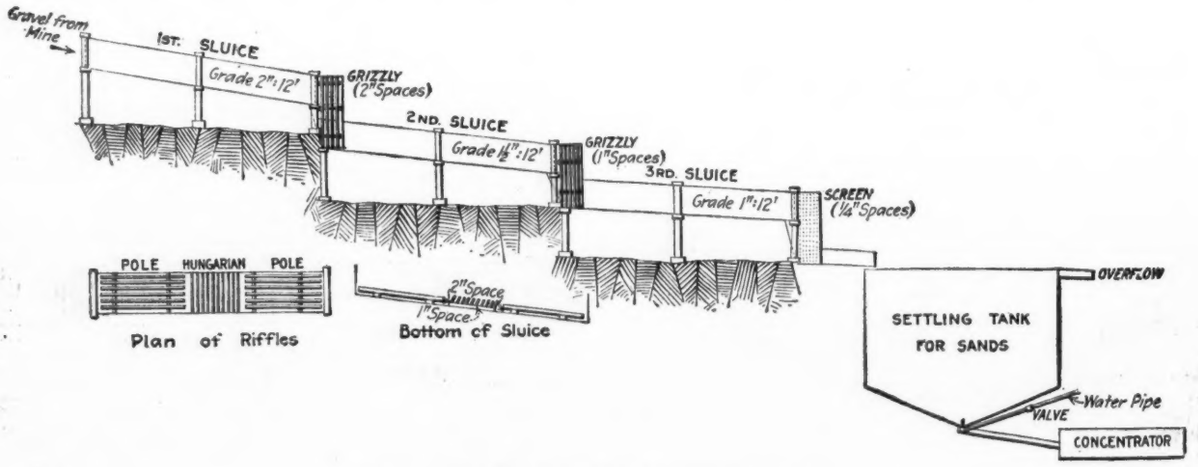


FIG. 6. TYPICAL GRAVEL-WASHING PLANT

Power Plant of the St. Joseph Lead Co.*

BY E. L. BROOME
Steam Engineer, Viele, Blackwell & Buck

Description of a new central power plant serving several mining properties in southeastern Missouri. Among the unusual features of the plant is the handling of the coal and the feed water.

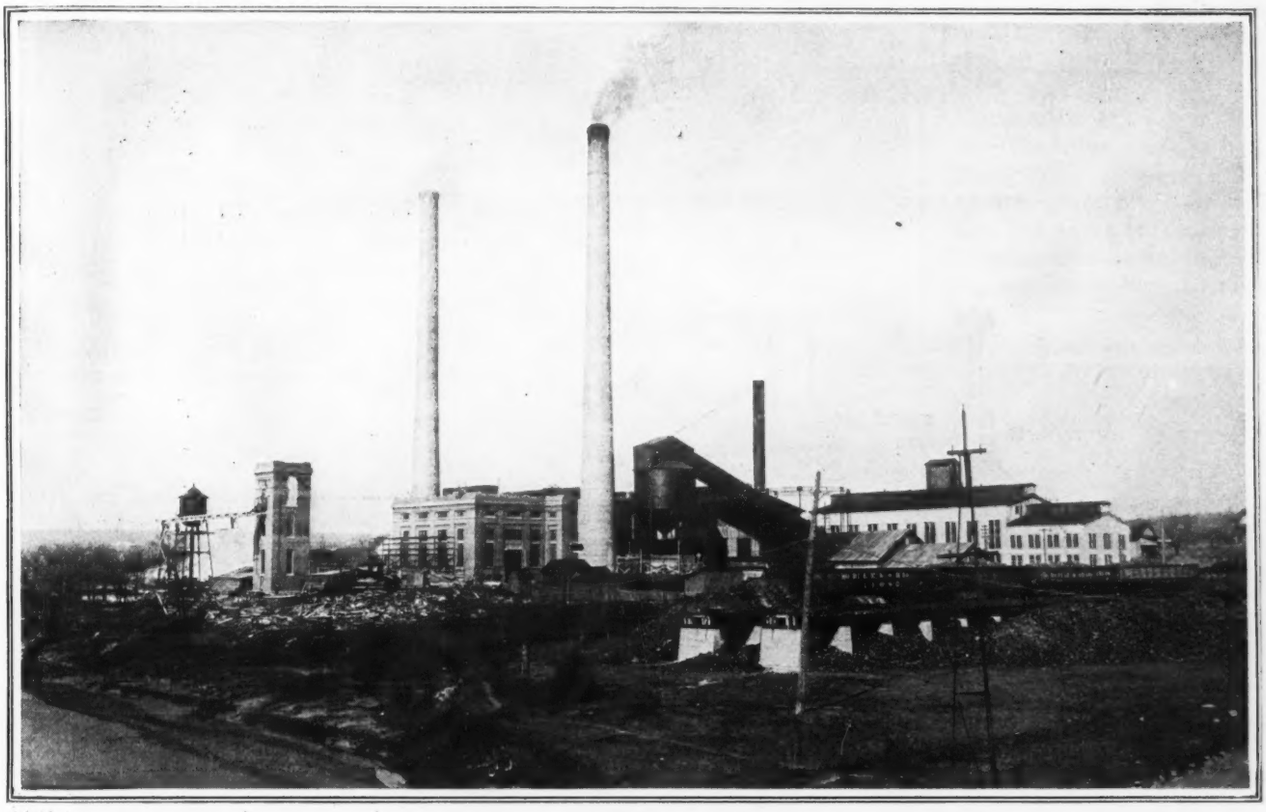
PRIOR to March, 1917, the St. Joseph Lead Co. and its allied companies, operating lead mines and mills in southeastern Missouri, generated their power at three separate points, each roughly at the apex of an equilateral triangle whose sides measure about six miles.

At Leadwood, which is at the western apex, there are one 1000-kw. high-pressure turbo-generator and one 1000-kw. mixed-pressure turbo-generator, the latter operating on exhaust steam from several steam-driven compressors and two horizontal noncondensing steam engines. Each turbine is served by a jet condenser with a spray cooling pond for the circulating water.

At Bonne Terre, the northern apex, there are three gas-engine driven, direct-connected generators with a total nominal capacity of 1620 kw., and at Rivermines, the southern apex, there are four gas-engine driven units of total capacity of 2160 kw. These plants are connected in parallel by tie lines between Rivermines and Leadwood, and Leadwood and Bonne Terre, but with no direct tie between Rivermines and Bonne Terre.

A gradual increase in the electric load, due to changes from steam to electrically driven machinery and the increase of production during the last three years, created a demand for power which rapidly outgrew the existing capacity and made necessary the installation of a new power plant.

The site of the new plants at Rivermines was determined largely by the situation of the center of gravity of the load and by the consideration of railroad facilities, space for coal storage and an available supply of circulating water. Ground was broken early in April, 1916, and in spite of the congested freight conditions and manufacturing delays, the first unit was started Mar. 22, 1917, and the second about a week later. While not a record performance, in view of the fact that the main equipment orders were placed during March, 1916, it compares well with similar installations even in less active periods.

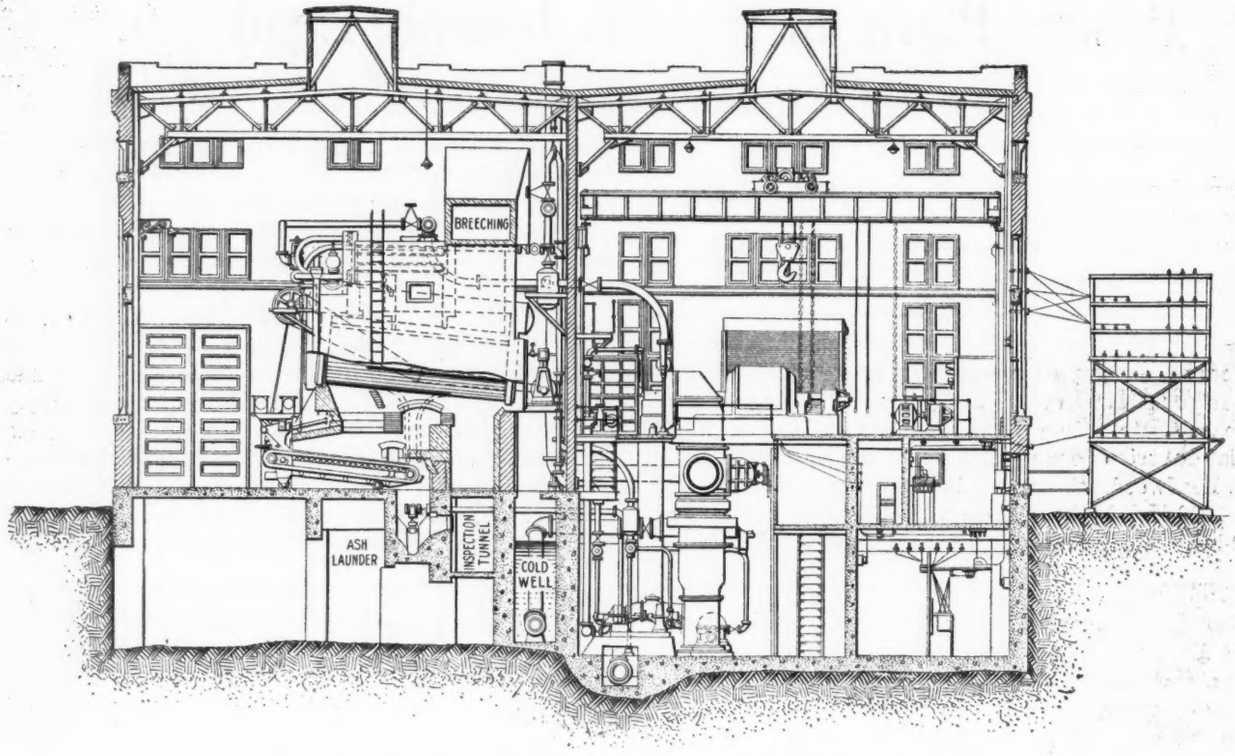


THE ST. JOSEPH PLANT AT RIVERMINES, MO., SHOWING POWER HOUSE, COAL BUNKER AND CONVEYOR

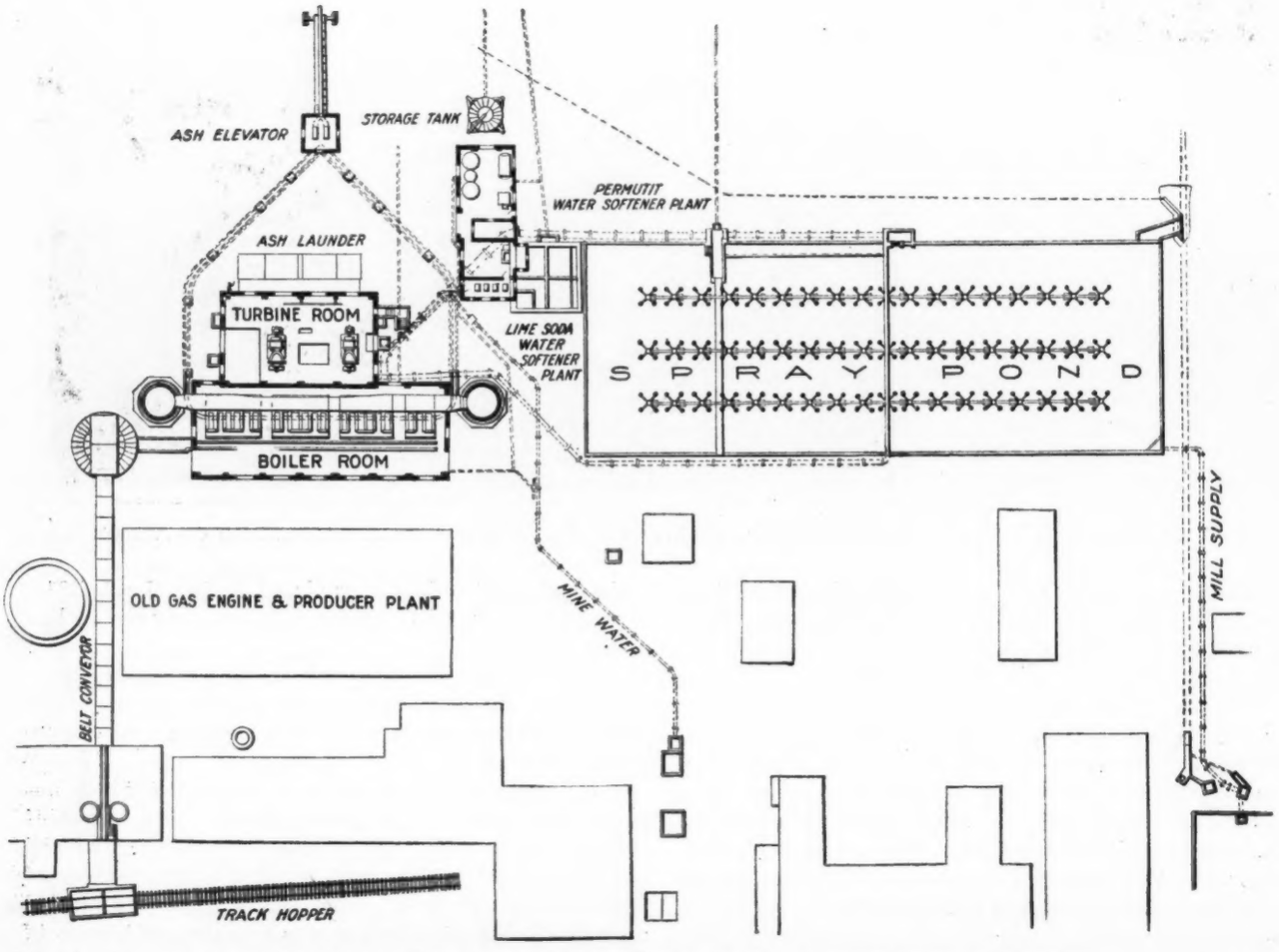
In general plan the plant follows the established practice for an installation of its size, but the unique treatment of several important details justifies a rather extended description.

The foundations are carried down to rock, which lies fairly level about 12 ft. below grade. The basement walls of the turbine room and the walls of the cold well are also carried down to rock, which is below river-water level; but in the boiler room the columns are carried on piers founded on rock, as are also the main loads of the boilers. Between the piers reinforced-concrete gird-

*Reprinted from "Power," Oct. 30, 1917.



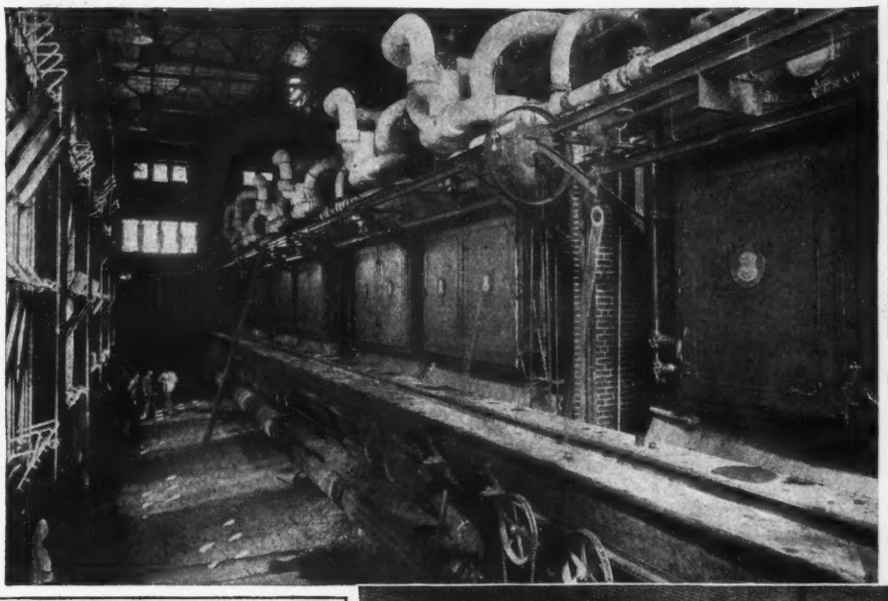
CROSS-SECTION THROUGH POWER HOUSE OF ST. JOSEPH LEAD CO.



LAYOUT OF ST. JOSEPH LEAD CO.'S POWER PLANT AT RIVERMINES, MISSOURI

ers are used, and as the overlay is largely compact hardpan and clay, it was possible to avoid considerable expensive excavation and to pour the girders without forms by trenching to the exact dimensions of the cross-section.

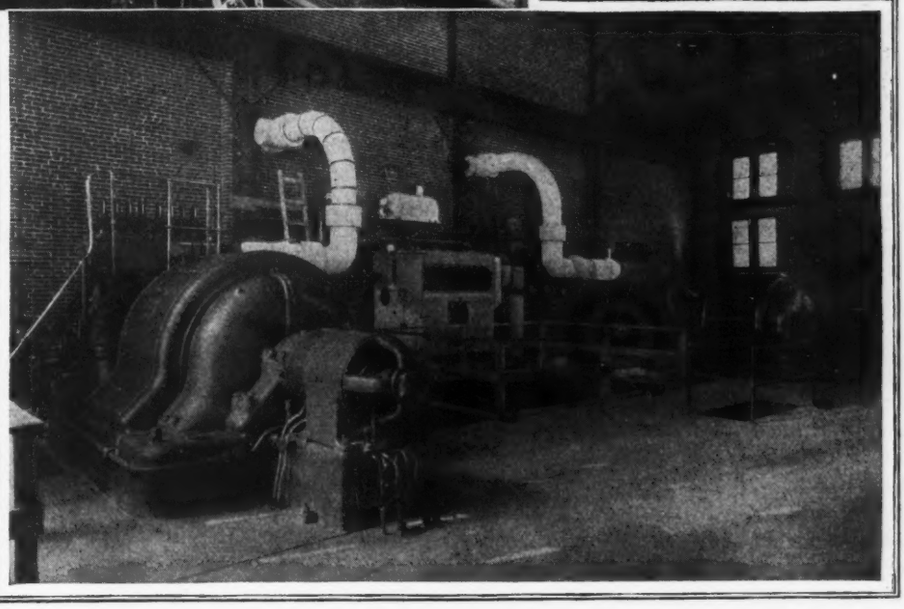
The boiler room is 119 x 43 ft. in the clear and accommodates seven Heine boilers, each of 518 nominal boiler horsepower with superheaters, located above the setting, the superheater flues being built into the side walls of the setting. The stokers are the chain-grate type and have an area of 124 sq.ft. each, or about $\frac{1}{4}$



DISTRIBUTING CONVEYOR IN BOILER ROOM

sq.ft. per boiler horsepower. Coal is received from an elevated track discharging into a 30-ton steel track hopper underneath, and by means of an opposed pair of reciprocating trough-shaped grizzlies the smaller sizes fall into chutes at each side of the crusher, and thence are fed directly to the belt, and the larger pieces roll over the ends of the grizzlies and fall into the center of a crusher hopper, from which they are delivered on a 20-in. inclined belt conveyor driven from the upper end and provided with a magnetic pulley for the removal of foreign pieces of iron. The belt conveyor discharges into a circular steel bunker, 30 ft. in diameter, lined with 4 in. of reinforced concrete and having a capacity of 400 tons. Under the bunker is an 8-ton weighing hopper provided with an automatic registering scale-beam, and discharging into duplicate horizontal helical conveyors, 12-in. diameter, extending the full length of the boiler room over the stoker hoppers, the trough being provided with a rack-and-pinion operated sliding gate over each stoker. The solution of the fuel-supply problem is rather unusual and results in a light, well-ventilated boiler room, and the spiral conveyors insure a very homogeneous condition of fuel at the stoker hopper and permit a uniform moistening of the fuel, a practice which the lead-company operators have adopted to prevent coking and at the same time avoid quantities of dust.

The stokers are driven in the usual way from an overhead lineshaft. Two stoker engines are installed, each of a capacity for driving the whole stoker plant, supported behind the boilers on overhead platforms. The stoker lineshaft is extended at one end through the boiler-room wall, and is provided with an additional drive by an alternating-current motor through reducing gears. The breeching, which is of steel plate, unlined but covered by 2 in. of magnesia, is carried directly upon the boiler settings at the rear, terminating at each end outside the boiler-room wall in a radial-brick chimney 255 ft. high and 9-ft. diameter at the top. As there is considerable surplus mine water, the ashes are disposed of by the launder or flushing method. The water is supplied either directly from the mine-water discharge system or from the outboard circulating-water pipe. The launder troughs, which are lined at the bottom with cast iron, slope each way from the center of the boiler room and meet outside the building in a large concrete sump on the bank of the river. The sump is surmounted by a brick tower in which the ashes and water are elevated by rigid buckets attached to two independent rubber belts and discharged

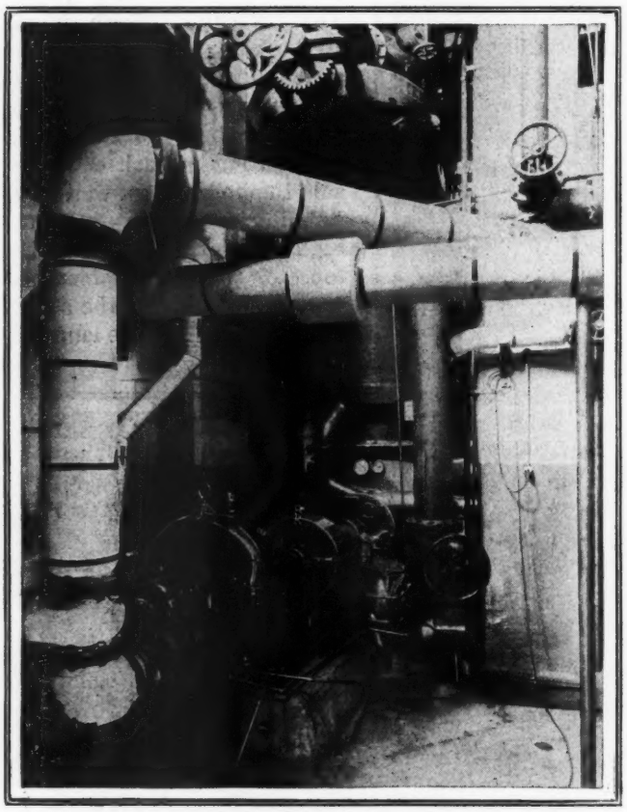


TURBINE ROOM OF ST. JOSEPH POWER PLANT, RIVERMINES, MISSOURI

at the top into an extended radial trough from which they can be distributed to the flats adjacent to the river.

The turbine room is 45 x 72 ft. in the clear, and is served by a 20-ton overhead crane. The racking and trolley movements are hand-operated, and the hoist motor is operated with control from the floor.

There are two 3000-kw. Curtis turbo-generators, with direct-connected exciter, each served by a LeBlanc jet condenser placed in the basement. Circulating water is pumped from a cold well between the boiler- and turbine-room basements, and is discharged through 270 spray nozzles into concrete ponds, having a total surface of 27,600 sq.ft. At the corner of one spray pond an overflow is provided to supply water to the mill. The spray ponds return the circulating water by gravity to the cold well, and at an intermediate point in the return pipe a constant supply of about 1500 gal. per min. of cold, fresh mine water is connected. Each generator is



CONDENSING EQUIPMENT AT RIVERMINES PLANT

supplied through spray washers with 15,000 cu.ft. of air per minute.

Water for boiler feed is drawn from the mine, and the experience of the company was such as to lead to insistence on the maximum of softening. The mine water runs practically continuously at 18 grains per gallon total hardness, equally divided between carbonates of calcium and magnesia. Two complete water-softening treatments have been installed. The lime-soda treatment of the continuous type takes the raw water at 18 grains per gallon hardness and turns it out at 5 grains per gallon hardness. This lime-soda treated water is then passed through a pressure sand filter into a Permutit softening filter. From the Permutit softeners the water, reduced to zero hardness, is led to the feed-water heater.

The desire for an absolutely continuous supply of softened water for the boilers led to duplication of pumps and to an arrangement of piping which would allow great flexibility in operation, of which the following are some of the features:

Continuous Supply of Softened Water Assured By Arrangement of Pumps and Piping

1. Raw water is normally drawn from the mine sump, but may be drawn from the spray pond.
2. Water softened by the lime-soda process may be taken directly into the feed-water heater, or into the 12,000-gal. steel standpipe which floats on the feed water-supply line.
3. The raw water may be taken directly through the Permutit plant and thence into the standpipe or feed-water heater.
4. Water may be passed through both plants.
5. In case of emergency, raw water may be sent directly to the standpipe or feed-water heater.

The use of separators as junction boxes is a novelty permitting the most elemental simplicity consistent with reliability in the arrangement of the main steam piping. From the outlet of Foster automatic stop valves each boiler is connected by easy bends to group piping, each group discharging into the side of one of two receiver separators, and from each separator the turbine connection is led direct, the two separators being connected at their top outlets with an 8-in. loop, at about the center of which the auxiliary steam connection is tapped off.

The boiler-feed piping follows the usual lines, but between the pump-discharge header in the turbine-room basement and the header overhead in the boiler room, there are two independent vertical connections, each containing a venturi-meter tube, each tube connected by capillary pipes to a recording and integrating board in the turbine room, so arranged that either tube may be connected separately to the recorder.

Use of "Constant-Pressure" Valve with Turbine

The auxiliaries are steam-driven, with the exception of one motor-driven feed pump. The auxiliary exhaust is discharged to an open Cochrane heater. A so-called "constant-pressure" valve is connected to each turbine to discharge surplus auxiliary steam into the low-pressure stage. In order to prevent overspeed from the auxiliary steam supply when the automatic throttle trip operates, a pipe to connect to the under side of the operating piston of the constant-pressure valve is led to the front of the turbine and there automatically opened to the atmosphere by a tripping device operated by the drop of the main throttle.

The electrical equipment consists of the two 3000-kw. generators, with direct-connected exciters, a motor-generator exciter set and station transformers. The current is threephase alternating 60-cycle, generated at 6600 volts and distributed at the same voltage. The switching system consists of duplicate busses with remote-controlled solenoid-operated oil switches mounted on pipe framework. The feeder circuits are equipped with three-phase aluminum-cell lightning arresters.

The whole installation was designed and constructed by Viele, Blackwell & Buck, engineers, of New York.

State Operation of Mines in South Africa*

By A. COOPER KEY†

Operation of mines in South Africa by the state has been declared to be ill-advised by those familiar with conditions there. The diamond-mining industry alone, from the peculiar circumstances surrounding it, might most easily be taken over by the government. Private enterprise is more efficient than public. By leasing, the state gets its share of direct profits and indirect advantages without danger or risk. The labor party in South Africa has tried, without success, to show that mining on the Rand is devoid of financial risk. Entry into mining would injure the state's credit.

THE Commission on State Mining of South Africa has issued an adverse majority report on the question of state operation of mines. The inquiry was largely confined to the Far Eastern Rand. It has been stated by the government mining engineer, Mr. Kotze, that the need of opening up this area, without delay, is urgent; if there is no prospect of areas favorably situated being worked by private enterprise on acceptable terms, then state mining may become imperative.

Mine Operation by South African Republic

During the Anglo-Boer War the late South African Republic worked certain of the best Rand mines which were already equipped and in running order. "The best stopes were worked, no development was carried on, stores found on the properties were used but not charged out against working costs; consequently it did not cause the commissioners any great surprise to learn that these mines were run with very successful financial results. It is, however, quite unlikely that the Union government will enjoy the same favorable conditions that the late republic created for itself."

The general manager of the South African Railways and Harbors, which are state-owned and managed, said with reference to government operation of collieries that as long as coal is available at a reasonable price he saw no reason for the inauguration of state colleries. A state-controlled mine might afford protection against inflation of the price of coal for local consumption; but, if not so economically worked, would strengthen the position of private companies in raising prices. The coal-bearing ground owned by the administration should not be worked departmentally; the administration should arrange, in consultation with the Mines Department, a price at which coal should be supplied to the railways, a royalty being received on coal sold to the public. In other respects the mine should be worked and controlled as a private concern.

The diamond industry is in a peculiar position. Since the conquest of German Southwest Africa the Union practically holds a monopoly of the production of diamonds, other sources of supply being practically negligible. The diamond has neither an intrinsic nor a standard value. Apart from its beauty, the demand for it depends upon its rarity and expensiveness. Its output must be restricted to maintain and increase its price. This can only be done effectively by monopolistic ownerships and from this point of view the state is in the best position to hold the monopoly. Competition among mine owners to supply the demand, now a constant danger, would cease or would be transferred to the buyers. The state would be able to regulate the production to insure an increase in price, indefinitely to extend the life of the mines, and preserve to itself a lucrative source of revenue. It is established that working costs increase and yield diminishes with depth.

Conditions Favor State Diamond Monopoly

Such a monopoly would mean the state expropriating on fair terms all the diamond mines in the Union, but most witnesses seemed to be appalled at the magnitude of the sum required and consequently hesitated to recommend that the state engage in diamond mining. Another advantage would be that the state could prohibit the opening up of new mines almost without exception, a menace that has always caused nervous apprehension. But for the chance and danger of a payable mine (as distinguished from an alluvial field) being opened up in Brazil or the Congo, the commissioners would have no hesitation in recommending state acquisition of all diamond mines. Partial control is not of much assistance, as was proved in the case of the German Southwest African fields. The government had power to limit the output but it would have been folly to have done so while the mines and alluvial fields in the Union were free to market an unlimited quantity of diamonds.

The price of diamonds is as good now as it has ever been; there are no accumulated stocks and the output is being restricted by the larger mine owners in their own interests. No agreement exists as to the quantity which may be produced by each, so there is a danger that any one of them may break away from the present wholesome practice, with consequences disastrous to the whole industry and the revenue of the Union. It would be almost impossible, not to say unfair, to restrict the output of river diggers, but the control of production would maintain and increase the price of diamonds to the great advantage of the state, the industry, and incidentally of the river digger. "In short it seems that never have circumstances and conditions been so favorable for intervention without disturbing the industry as at the present time." Under existing conditions, the burden of maintaining practically a monopoly in diamonds and safeguarding the industry by acquiring any new sources of production falls upon the shoulders of the large mine owners.

Private Enterprise More Efficient

As for state-control in general, however, it has not been proved to the satisfaction of the commissioners that the state is able to carry on any industrial occupation as efficiently as private enterprise. Witnesses who pointed out what was being done in munitions work

*Excerpts from the majority report of the Commission on State Mining of South Africa.

†Box 3621, Johannesburg, Union of South Africa.

in England today spoke superficially without either definite knowledge or information. Circumstances in England are obviously abnormal. The present activities of the British government are being conducted on democratic lines, and we have no knowledge of the cost.

It has been urged that state-mining would remove suspicion from the public mind occasioned by leasing. But this is, at most, a doubtful advantage, because it is likely that greater suspicion would be occasioned by the many appointments that the state would have to make. It is also urged that for the sake of indirect profits, such as the benefits of increased population and markets, the state can afford to work at a small loss because the richer parts will keep the poorer going within limits. This harmless, even attractive, proposition at the first glance requires further examination.

Extraction of Unprofitable Ore

Mining companies do, of course, work a large amount of unpayable ore for well defined reasons. Rock which yields sufficient returns to cover working costs, exclusive of development, is treated, because it helps to reduce the average working cost and prolongs the life of the mine. By persevering with an unpayable stope it may become payable deeper in. Stopes are not as a rule abandoned when the assay value drops below working costs. Were this the case, many mines would soon have little besides unpayable stopes left. If, however, the argument, that for the sake of indirect profits mines could be worked by the state even at a small loss, were followed in all cases, it would be extremely difficult to condemn even the most wasteful of state enterprises.

Unless conducted on sound business and technical lines, state mining will be a good thing only for those employed therein, but possibly a disaster to the country and the taxpayer. Under the leasing system the state will at least get its share of direct profits and reap the indirect advantages of working the payable areas and exploiting the unpayable ores, without itself running either danger or risk. If relief has to be provided for the poor, or work for the unemployed, this can best be done by irrigation schemes, that would be reproductive and of great advantage to the state.

Mining Risk on the Rand

As far as mining risk is concerned, while the Main Reef is probably the most persistent gold-carrier known, even Rand mining has its ups and downs. One of the particular risks in the district, according to Dr. Mellow, the geologist, is the irregular distribution of mineral deposits or payable areas. These are frequently separated by large areas of country and it would be by no means impossible to locate a mine on a totally unpayable area. These extensive blanks involve the taking up of large tracts. The idea that rich shoots continue on the same line is fallacious. Witnesses agree that the factor of risk varies inversely as the size of the area adopted as a mining venture. The factor varies in each particular case both as to the continuity of the orebody and its gold content.

To emphasize the absence of financial risk in mining in the Far East Rand, as an incentive to state operation, the representatives of the South African labor party tabulated certain information concerning eight selected companies. Seven are gold-mining companies, and the eighth is a land and financial company largely interested in mining. They are shown to have a capital of £7,442,652, while the market price in September, 1916, was £30,591,877. "The profit of 23 millions on these eight companies is very alluring," runs their statement. "Would it cause any surprise that financiers strive, by every possible means, to possess themselves of all new and payable areas to the permanent loss of the people?"

The majority commissioners find it difficult to understand why the results of only eight companies were taken into consideration when there are no fewer than 21 concerns either operating or closed down, the latter because individual or neighboring results were such as to discourage the provision of further capital or the raising of fresh capital. Two companies (the Benoni and Apex gold section) had such doubtful prospects that they found it advisable to amalgamate with the New Kleinfontein; eight have made large appropriations out of profits; in addition a large amount has been spent by companies that have combined, which sum has disappeared after amalgamation. The report gives instances of eight companies that shut down, owing to poor development.

Success of Leading Producing Companies

The Modder B, once it started after some years of dormancy, has been remarkably successful. The total capital, including accrued interest, was just over a million, against which £1,855,000 has already been paid in dividends. Brakpan, which is much deeper, has, in 11½ years since sinking started, not quite repaid the £1,461,850 of capital accrued. New Modder, the premier mine of the Rand, with its £4 shares standing at £21, and above that sum in profit in sight (undiscounted) and a large undeveloped area, does not show up so well, owing to hesitancy in the pioneering days of the district. Though sinking started in June, 1895, and crushing in May, 1896, it was not until Christmas, 1906, that the first dividend was paid. While £1,481,362 was received for shares, an even greater sum, £1,661,590, has been appropriated from profits, a policy which is still in force. With accrued interest, the total capital supplied is put down at £3,515,612, compared with £3,207,500 paid in dividends.

New Kleinfontein has not repaid its capital and accrued interest by £182,000. Modder Deep spent £922,826, was 4½ years developing and has paid £512,500 to fortunate shareholders, the shares (£1) now standing at nearly £7. But the position of Geduld is far less pleasing, it having spent £1,117,458 capital provided by shares, and £501,382 provided out of profits. Accrued interest is put down at the huge sum of £770,465. Against a total of £2,389,305 for these items the dividends paid have been only £240,125. Van Ryn Estate, an outcrop mine with a satisfactory grade and with £620,000 capital and costs on a moderate scale, has distributed a total of £2,407,000 in dividends. In the Van Ryn Deep the cash supplied was nearly £1,600,000, while accrued interest is put at £418,500, dividend distributed £1,256,736. The Nigel, an outcrop mine, regained £237,600 capital and has paid £864,500 in dividends in its career of 30 years, which is apparently now approaching termination. Sub-Nigel has spent over a million, if allowance be made for accrued interest, while only £118,600 has been paid in dividends.

The record truly reflects the good and bad luck of the Far East Rand, and no doubt the history of its future mining ventures will be much the same. The mine owner is by no means sure of his reward. The risks are many, but, on the other hand, the outstanding successes from time to time encourage and reward the enterprising financier for his boldness and perseverance, to attract others with fresh capital into a new country, and even to create a longing in the hearts of some citizens to possess some of this wealth for themselves by clamoring for state mining.

Scattered Responsibility of State Control

The financial risks and difficulties of mining on the Far East Rand are highly technical matters and the commissioners have relied upon the opinion of the government mining engineer. The state has neither the necessary experience nor organization to carry on such a highly specialized occupation as mining. Moreover, scattered responsibility is fatal to any enterprise. In time it degenerates into an almost total absence of responsibility. It is an evil in state organization that economy is invariably practiced in the remuneration of chief executive officers on a scale which compares very unfavorably with what is considered adequate under private enterprise. The state system creates inefficiency, inertia and lack of expedition that hampers the most capable officers. Although promotion by seniority aims at abolishing favoritism, this puts a premium on mediocrity.

The entry of the state into so speculative an undertaking as mining would tarnish the state's credit, it is agreed. The most serious and far-reaching disadvantage would be the effect on the activities of its large financial and mining concerns. If the state were to select the most promising areas, the mining houses would have to search outside the Union for fresh fields suitable to their peculiar ability, experience and enterprise.

What the mining companies have done for the industrial development of South Africa can scarcely be overestimated. They have become such valuable assets to the state that they cannot now be dispensed with except for very strong reasons. When they refuse to develop the mineral resources on acceptable terms, it will be time to dispense with their services, but this position is not likely to arise.

Urge Active Operation of New Gold Areas by Private Enterprise

Only 33 of the 58 mines producing gold in 1914 will be producing in 1924, it is calculated, but "in all probability the number of companies which will drop out of the producing stage within the next seven years will be considerably less than 25. The likelihood is also that among the first to drop out will be those now producing on a small, almost insignificant scale." Nevertheless, no time should be lost in dealing with the state's assets. They can be more expeditiously worked by private enterprise than by the state. The majority report, moreover, expresses the opinion that the rise in world prices is due rather to world trade, prosperity and competition than to an overabundance of gold, the drop in purchasing power not necessarily indicating such overproduction. The opening up of new mines is a matter of urgency.

Recent Industrial Uses of Aluminum*

The following aluminum products have practically all reached stages of commercial importance during comparatively recent years: Aluminum foil; aluminum bottle caps and jar closures; manufactures involving autogenous welding; die and pressed castings; tubing for store service; rolled rod for machining purposes; aluminum conductors, steel reinforced. The aluminum-foil industry has grown from practically nothing to a volume of business involving many tons of aluminum annually. Aluminum bottle caps and jar closures on the market have, like foil, advanced from a meager beginning to a business of substantial proportions in a few years.

The development of a process of welding aluminum by means of the oxyhydrogen and oxyacetylene flame has opened an almost limitless field for the outlet of aluminum. Sheet aluminum of all gages heavier than about $\frac{1}{32}$ in. can be readily welded and the seam dressed off so that it is difficult to find the joint. Consequently it is possible to build up an aluminum tank or container of almost any size and shape which, when welded together, is practically a one-piece job. This class of material finds a place wherever seamless metallic non-rusting containers are wanted. The one-piece feature is of marked advantage over the riveted tank which is always liable to spring a leak.

For a long time it has been considered difficult to die-cast aluminum. This problem seems to have been solved as there are several companies that claim to be doing it successfully.

Sand Castings Improved by Pressure

Another recent development is the subjecting of sand castings to high pressures in order to render the metal more dense and to increase the strength. Such castings not only possess extra strength, but also machine exceptionally well. Aluminum tubing for pneumatic store service is not a new field, strictly speaking. However, the last few years have seen the volume of aluminum consumed for this purpose reach a tonnage of great importance. The natural characteristics of the metal itself principally recommend it for this use.

One of the most interesting developments in the industry in recent years is the rolling of high-alloy rods in practically all commercial sizes. In the past, commercial aluminum rod has been largely a drawn product. This has prevented the use of aluminum alloyed with any appreciable percentage of other metal because in the drawing operation principally the surface of the rod is worked. The result is that the surface becomes hard while the body of the rod is left comparatively soft. Therefore only the smaller sizes of drawn rod are suitable for machining.

Rolling Process Gives Uniform Rod

By the rolled method of manufacture, however, not only is it possible to use highly alloyed metal, but the process also tends to work the entire mass of the rod so that the finished product is a uniform, homogeneous material which machines well throughout its entire

*Excerpted from an article by F. G. Schull, of the Aluminum Co. of America, printed in the "Journal" of the American Institute of Metals, Vol. XI, No. 1.

substance. This process, therefore, makes available a good rod in all commercial sizes for automatic machine and turret lathe products.

One of the first uses for which this rolled rod was tried was for the machining of the fuse-timing parts for shrapnel. While it worked perfectly for this purpose, it so happened that the principal timing parts were of such a shape that in making them from rod it was necessary to cut away a great deal of the metal, resulting in high scrap loss. It was found that sand castings of the general shape of the parts to be made could be subjected to a compression process and rendered highly satisfactory for this purpose, with a minimum of scrap loss. Consequently, as a commercial proposition the rolled rod could not compete with the compressed castings for this particular article. It will without doubt, however, find wide usage for automatic machine products.

Reinforced Aluminum Cable Little Understood

Aluminum cable, steel-reinforced, is not a particularly recent aluminum product, having been in commercial use on an extensive scale for the last few years. It is, however, so little understood as to warrant reference to it in this paper. The excuse for the existence of such a product as this lies in certain inherent characteristics of aluminum which needed improving in order to recommend its use for long-span, high-voltage work. The coefficient of expansion of aluminum is approximately one-third greater than that of copper. Due to this greater expansion the aluminum line lengthens a little more with temperature rise, and shortens a little more with temperature fall, than copper. The result is that it is necessary to string aluminum wire with greater sags than copper wire in order that its strength may not be overtaxed at low temperatures.

This was a condition of comparatively little importance in the early days of low voltages and short spans, but with the advent of higher voltages and long-span, steel-tower construction these characteristics of aluminum cable became a serious menace to its commercial existence. What aluminum cable lacked was high tensile strength and low coefficient of expansion. In order to impart these characteristics it was proposed to make the center strand of a seven-strand cable of steel, and the six outer strands of aluminum, the steel to furnish the strength, and the aluminum the electrical conductivity. A high-grade plow-steel wire was selected, which was triple-galvanized to prevent corrosion, and the practical tests that followed proved that the theory was correct and that the composite cable took on characteristics different from either of the component metals and proved highly satisfactory for long-span work.

It is feasible to construct these cables with any standard number of strands, varying the proportion of steel and aluminum to meet the particular strength and sag conditions required. This steel-reinforced cable has grown in favor from the start, so that today many of the modern transmission lines on the American continent are built with this cable.

While the automobile industry is, of course, the big factor in the aluminum business today, the relative importance of some of the other fields for the metal seems to be greatly increasing.

Use of Cartridge Scrap*

By H. W. Brownsdon

From the strip to the cartridge case the engineer and the metallurgist must work in close coöperation, the former to design and produce the tools and machines with which to work the metal stage by stage to the desired finished form, and the latter to see that the metal is in no operation over-strained and that between operations strains are sufficiently removed by correct annealing conditions. Of subtle and not thoroughly understood difficulties there is none. Success lies in never-flagging, close attention to detail and continual intelligent application of scientific control.

The interest that the ammunition manufacturer has in cartridge brass does not cease with the production of the finished cartridge case, for of the components of a cartridge the case alone is left undestroyed, the propellant and the shell or bullet being completely consumed so far as further useful recovery is concerned. Cases other than those of small arms, if not damaged mechanically, may be re-formed to size and used again. Small-arms cases, however, after once being fired, suffer a deterioration which not only prevents their being used a second time, but which also makes impossible their utilization as scrap for casting cartridge brass. The causes of this deterioration are metallic mercury and antimony salts, products from the explosion of the ingredients of the percussion cap. A part of these products is retained on the interior surface of the case. From the point of view of re-using the case as a case, it is the weakening effect of the mercury on the strength of the brass that gives the trouble. From the point of view of using the fired cases as scrap for remelting, antimony is the bugbear. Much may be done by washing the fired cases in suitable solutions, but even after repeated treatment in this way, when put into a heat for best cartridge metal, antimony will be found in harmful quantities in the ingot.

The economical utilization of scrap forms such an integral part of the brass maker's business, that this question of the use of fired small-arms cases as scrap is one of considerable magnitude when the demand for cartridge brass of high purity is urgent.

*Excerpt from a paper in "Journ. Soc. Chem. Ind.," July 31, 1917.

Personal Liability of Mine Superintendent

By A. L. H. Street†

A mining company's superintendent, in general charge of the work of constructing a tunnel, is not personally liable for injury to an employee, caused by an explosion of dynamite in the process of the work, if the injured man was under the immediate supervision of a foreman and if the accident would not have occurred had the general instructions of the superintendent been observed, according to a recent decision of the Washington Supreme Court, handed down in the case of Macario vs. Alaska Gastineau Mining Co., 165 Pacific Reporter, 73.

†Attorney at law, 329 Security Bldg., Minneapolis, Minn.

Notes on Vacuum Filtration of Flotation Concentrates

BY RALF R. WOOLLEY*

Dewatering of flotation concentrates is best accomplished with vacuum filters. Dryness of cake depends largely upon volume of air that passes through it, but amount of air required varies with nature of pulp. With piston displacement constant, volume of air bears inverse ratio to degree of vacuum. Power consumption proportional to quantity of free air handled.

Concentration by flotation has added a number of new problems to the metallurgical field, and one of no little consequence among these is the drying of the concentrates. This step is necessary before the smelter will accept the material, and also from a point of economy in freight charges where there is much railroad haul. Usually the ores treated by this process are of low-mineral content and this of course prohibits any expensive means of treating them. Consequently the dewatering part of the process must be done cheaply

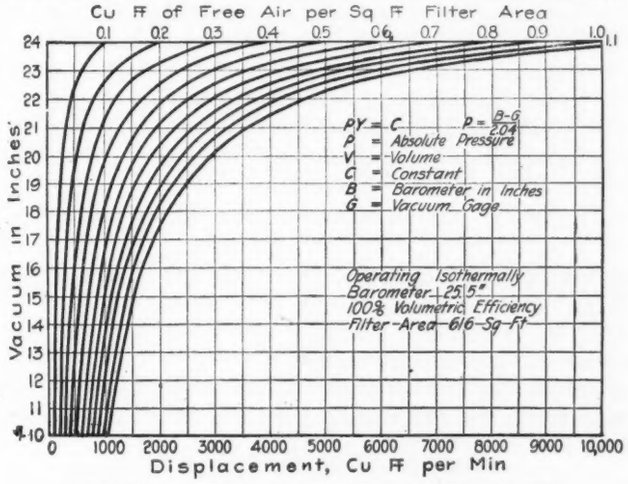

Cu Ft of Free Air per Sq Ft Filter Area
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1
Vacuum in Inches
24 23 22 21 20 19 18 17 16 15 14 13 12 11 10
PV = C P = B-G / 2.04
P = Absolute Pressure
V = Volume
C = Constant
B = Barometer in Inches
G = Vacuum Gage
Operating Isothermally
Barometer 25.5"
100% Volumetric Efficiency
Filter-Area 616-Sq-Ft
0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10,000
Displacement, Cu Ft per Min

CHART 1. CUBIC FEET DISPLACEMENT FOR 14 x 14-FT. FILTER

to be commercially successful. Thus far various methods have been tried, the most successful one being the use of filters of one type or another, the best results having been obtained from the continuous-vacuum type.

The data given herewith were obtained from an installation of two 14 x 14-ft. vacuum filters of the Portland make. The pulp is settled in Dorr thickeners and piped from these to an elevator lifting it into the filter troughs. The average moisture in the feed is about 50% and that in the cake about 20%. Of the solids in the feed 80% pass through 200-mesh screen and form a dense cake of high resistance to the flow of air. The average barometer at this plant is about 25.76 in. and the elevation is 4350 ft. above sea level. The vacuum maintained was from 17 to 19 in. average.

To produce a relatively dry cake it is obvious that much depends upon the volume of air that passes through it, as the air is the medium which carries the moisture away. To make any assertion as to how much air is required for vacuum filters would be folly, because each material presents its individual difficulties. In general we may say that for most filter installations the vacuum pumps are so specified as to allow from 0.5 to 1 cu.ft. per min. piston displacement for each square foot of filter area. However, this does not satisfy in all cases. For example, a certain chemical company filtering precipitated bicarbonate of sodium met with no success until it used a filter capable of handling 30 cu.ft. per min. per sq.ft. of filter area. These machines were not operated at full 30 cu.ft. capacity, but used an average of 15 to 20 cu.ft. per min. per sq.ft. of filter area. The results were good. The cake contained only 7 to 8% moisture, where it had been too wet to handle before.

With a constant piston displacement, the volume of free air passing through any filter cake bears an inverse ratio to the number of inches of vacuum, and a direct ratio to the imperviability of the cake. This relation is expressed by the formula:

$$PV = C,$$

where

P = Absolute pressure;
V = Volume, and
C = Constant.

The absolute pressure is indicated by the formula:

$$P = \frac{B - G}{2.04}$$

where

P = Pressure expressed in inches of vacuum;
B = Barometric pressure in inches, and
G = Vacuum-gage reading in inches.

Thus, with a given quantity of free air, the piston displacement necessary to handle it will increase as the absolute pressure decreases, or as the barometric pressure in inches increases. Chart No. 1 is a graphic of the above formula based on a filter area of 616 sq.ft., or one measuring 14 x 14 ft. For example, if it is necessary to pass 0.6 cu.ft. of free air through each square foot of filter area per minute, and maintain 21 in. of vacuum, it will require a piston displacement of 1900 cu.ft. per min. Likewise if the piston displacement is constant, the amount of free air being drawn through the cake can be determined for any vacuum.

HIGH MOISTURE NOT NECESSARILY DUE TO LOW VACUUM

A common excuse given for high moisture in filter cakes is "low vacuum." This is not necessarily the case. As was pointed out above, the quantity of air passing through the cake is the important factor, and with a constant piston displacement this decreases as the number of inches of vacuum increases. This would seem to justify the conclusion that the greatest vacuum is not the most effective in filtering. There is undoubtedly an economic point of vacuum for every individual case, and this can only be determined by experiment.

*Mining engineer, Salt Lake City, Utah.

It will be noted from Chart No. 1 that when the vacuum is more than 19 to 20 in., the required piston displacement increases rapidly for a slight increase in the amount of free air. Consequently, in working out the most efficient installation, the economic factors must be balanced against the mechanical factors. In doing this the increased costs, necessary to handle greater volumes of free air through high vacuum, must not be as great as the additional benefits derived from such an installation. In general, it may be stated that the amount of vacuum to use in any case is that which will build a cake and permit the most free air through the cake at the least cost. To determine this necessarily requires experimental work in each individual case.

Power Consumption

The power consumption is proportional to the quantity of free air handled. If the pump is operating isothermally the work done is indicated by the formula:

$$W = P_1 V_1 \log_e \frac{V_1}{V_2} + P_2 V_2 - P_1 V_1$$

where

P_1 = Initial pressure in lb. per sq.ft. (absolute);
P_2 = Final pressure in lb. per sq.ft. (absolute);
V_1 = Initial volume in cu.ft.;
V_2 = Final volume in cu.ft., and
W = Foot-pounds.

Then the horsepower required is:

$$HP = \frac{WV}{33{,}000}$$

where V = volume of air, in cubic feet per min., entering the pump. If the pumps are operating adiabatically,

$$W = 3.463 P_1 V_1 \left[\left(\frac{P_2}{P_1} \right)^{0.29} - 1 \right]$$

The power required for handling 1000 cu.ft. of air per minute at different degrees of vacuum is shown by Chart No. 2 for both isothermal and adiabatic operation. An interesting thing in connection with the power requirements for vacuum pumps is the fact that the curves are hyperbolic. The power begins at a minimum with no vacuum, increases to a maximum at 60 to 70% vacuum and decreases to a minimum again with perfect vacuum. An examination of these power curves shows the isothermal operation to require less power, and it is possible even to decrease these requirements by preheating the pulp and keeping the exhaust at a constant temperature. This procedure, however, involves additional costs, and the problem resolves itself into one of economy, as a question whether the additional benefits more than offset the increased expense.

From these curves it is very easy to determine the amount of vacuum to be carried for the least power consumption, and thus avoid operating at the most expensive point, which in the case at hand is 17.6 in. on the one and 15.5 in. on the other. Any vacuum above or below these points requires less power to maintain.

Selection of Filter Cloth

The filter covering is important from the standpoint of efficient operation of the machine. These coverings are made of duck or twills of various weights. The kind to be used on any filter depends largely upon the character of the material to be filtered. Generally speaking, with a fine, compact material the best results are obtained with a light twill of as loose weave as can be used without having the material go through it. By doing this the cloth offers a minimum amount of resistance to the flow of air into the vacuum, and the cake gets the full benefit of all the air. The tendency to clog the pores of the cloth is much less than with a close-woven duck.

With a cake of loose, granular material a duck cloth will generally give good results. The cake may not offer enough resistance to form an economic vacuum of itself, and this can be adjusted by using the proper cloth. The cloth to use for any given material to get the best results is one which, one might say, balances the economic vacuum against the moisture in the cake. This, of course, involves such factors as the character of material, vacuum, power, etc., and is not a matter of definite knowledge until it has been determined by experiment. For the material mentioned in this paper a light twill cloth, known as No. 3 Oakdale, has proved much better than the heavier and more compact grades.

The operating speed for a filter depends upon the quantity and quality of cake desired. In general, this

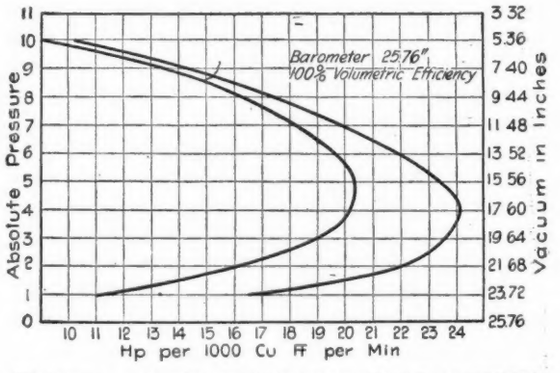


CHART 2. POWER CURVES FOR VACUUM FILTER

varies from 5 to 15 min. per revolution of the drum. With a material easily filtered the machine can be operated faster and will handle a larger tonnage. On the other hand, a material difficult to filter must be exposed to the vacuum longer. Hence the speed of the machine is less and usually the tonnage treated is less.

Ratios of Filtering Factors

Thus far the important factors connected with the operation and work of vacuum filters have been considered only in an individual way. The relation that these factors bear to one another is problematical in some cases, but the data given herewith show some distinct tendencies which may develop into definite ratios with further experimental work. From the fact that the amount of free air passing through the cake is so important in the moisture extraction, it is interesting to know what relation exists between this factor and some of the others. With a given piston displacement the amount of free air passing through the filter per unit area is a maximum when there is no vacuum, or when there is no cake on the filter. It is then equal to the piston displacement divided by the area of filter surface. As the cake forms the vacuum is created, and the quantity of air then varies with the amount of vacuum, as shown above.

Results obtained over a period of 30 days with an average vacuum of 19 in. show a range from 15.6 to

24.7% moisture in the cake. Even with a wide range in the inches of vacuum a lack of definite relation was shown by the plotting of results on charts. The fact that these charts show no tendencies toward a definite ratio may be due to a lack of uniformity of other conditions. It is believed that with careful work, through a greater range of vacuum, definite tendencies would be established. It will be observed from Chart No. 1 that with a vacuum between 15 and 20 in. the amount of free air for each inch of vacuum is small, so that the relative effects can only be determined by careful work. Again the material may vary somewhat in character, and may be subject to cracking more at one time than another on this account. A cracked cake offers lines of least resistance which the air invariably takes, and as a result the full benefits from the amount of air used are not obtained.

Other charts, plotted to show what part the character of the feed plays in the filtering of it, indicate that the amount of water extracted decreases as the area exposed increases. In other words, the smaller the particles the greater the exposed area and the higher the per cent. of moisture remaining in the cake. This is true because of the increased force necessary to separate the moisture from small particles, the force of adhesion increasing within the pulp as the particles decrease in size. It is quite obvious that in working out the best filter installations for any given material all of these factors must be given due consideration, not separately, but collectively. There is undoubtedly a stage in the operation where the power, vacuum, speed and moisture extraction are at a point of maximum economy, so that the maximum extraction and capacity are possible with the minimum expense. This stage cannot be specified without working out a series of experiments.

Molybdenum at Star Lake, Manitoba

J. S. De Lury, lecturer in geology at the University of Manitoba, has made a report to the Public Utilities Commission of Manitoba on the molybdenite prospects in the Star Lake district of that province, where a number of molybdenite claims have been taken up. In a full description of the geology of the district he states that there are at least two separate intrusions of granite, and an ancient lava, now altered into chloritic and hornblendic schists and tilted almost vertically. These schists may be classed as Keewatin, and the later red granite is thought to be responsible for the presence of molybdenum in the pegmatite dykes. The dykes vary from coarse pegmatite to fine aplite and contain a variety of minerals in addition to the molybdenite—bismuth and beryl being the more noteworthy because usually absent in such formations. The molybdenite occurs in a variety of forms, including six-sided prisms, fine-grained, massive, radiating lamellar, lamellæ and small flakes. The first two types are the more abundant. In summing up, Mr. De Lury states that molybdenite has been found over a considerable area and seems to be fairly persistent through a certain type of pegmatite vein, which is prominently developed in the schists for some distance from the contact with the granite. It is almost impossible to judge of the mineral contents of the ore as seen on the dumps or in the excavations, but it can be said that molybdenite occurs fairly generally distributed through the pegmatites, and as far as can be judged from the excavations already made in quantities sufficient to encourage further development and prospecting.

Manganese in Central Kansas

Manganiferous specimens running about 9% Mn were discovered some time ago on the surface of the uplands about three miles northeast of Raymond, in central Kansas, according to W. A. Whitaker and W. H. Twenhofel, in *Economic Geology* for August, 1917. The soil of the farm on which the rock was found is a sandy loam, apparently fertile and seemingly produced through the weathering of Dakota sandstone. The region which produced the specimens consists, for the most part, of a flat basin-like area at the head of a small valley. The owner of the farm stated that bedrock of similar character occurred in many places less than a foot beneath the surface. This was not verified, though believed to be true.

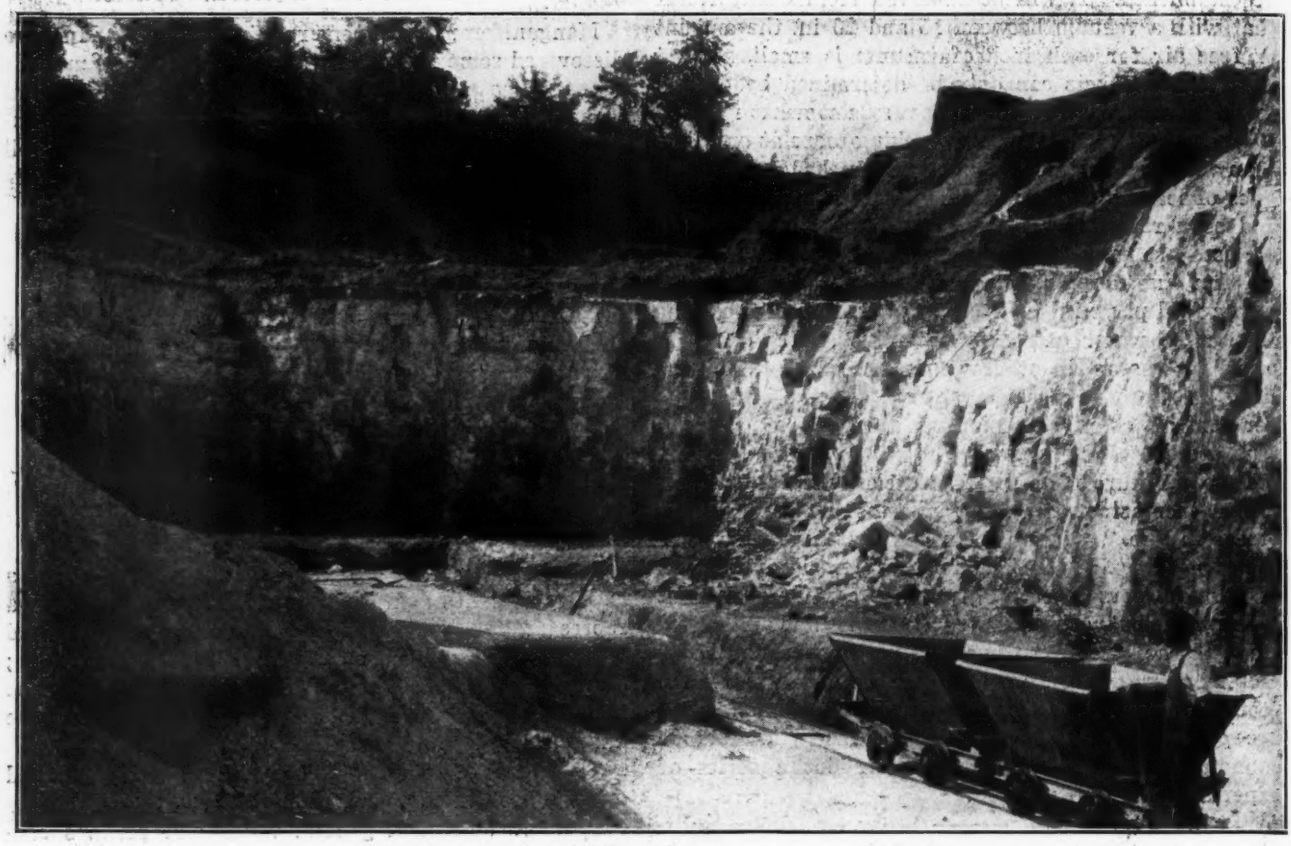
The specimens scattered on the surface are dark-brown to black in color and are friable and soft. They resemble partly weathered fragments of Dakota sandstone, but differ therefrom in being more friable, less porous and of a darker color. Since Dakota sandstone is known to underlie the region, it is probable that a local variety lies beneath the field. The following is a representative analysis of the substance: Moisture and volatile, 4.24%; SiO_2 and insoluble, 71.75; Fe_2O_3, 4.74; CaO, 1.43; MgO, 0.80; SO_3, 4.86; Mn_3O_4, 12.08%. The manganese appears to be present as "wad," an impure mixture of manganese oxides.

The source of manganese is not known, but is assumed to have been in the sandstone, whence it was probably concentrated through ground water and perhaps bacterial action, in the basin-like area where found, through subtraction of substances other than manganese and enrichment of what remained through precipitation of manganese from solution. The water probably obtained it from the sandstones which underlie the higher fields surrounding the area. It is considered improbable that the manganese content will increase in the deeper lying strata.

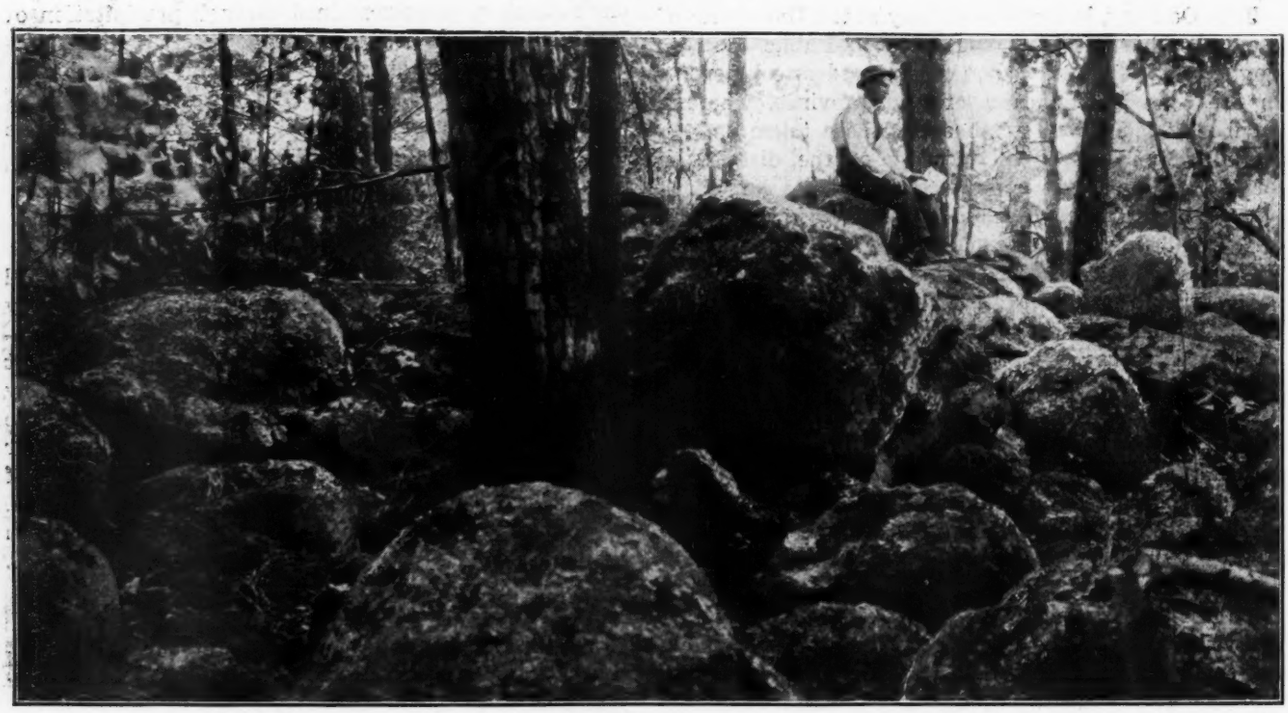
Phosphate Production Curtailed

The phosphate mines of the American Agricultural Chemical Co. have not been operated to full capacity during the past three years, owing to the war's elimination of export shipments, according to the annual report of the company. A heavy demand for phosphates by European countries is anticipated, however, with the return of peace. Kelpweed, alunite, feldspar and other materials are present sources of limited amounts of potash but do not promise an adequate normal supply. The company's potash fields in Spain have not yet been explored because of difficulties presented by the war. Exploration work on near-by properties is encouraging. The most satisfactory statement that can be made as to potash is that fertilizers containing none of it have generally given satisfactory results in the last two years, as they did in the early years of the industry, before potash salts were discovered in Germany.

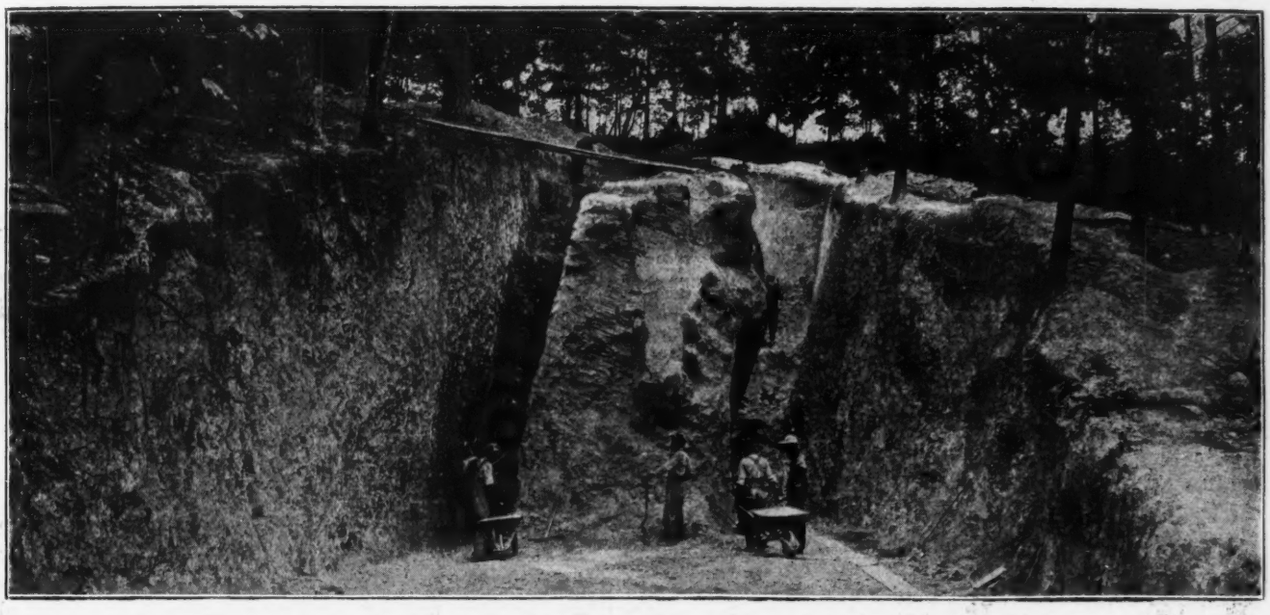
Economic Mineral Deposits in Georgia



FULLERS EARTH MINE OF THE GENERAL REDUCTION CO., AT DRY BRANCH, TWIGGS COUNTY

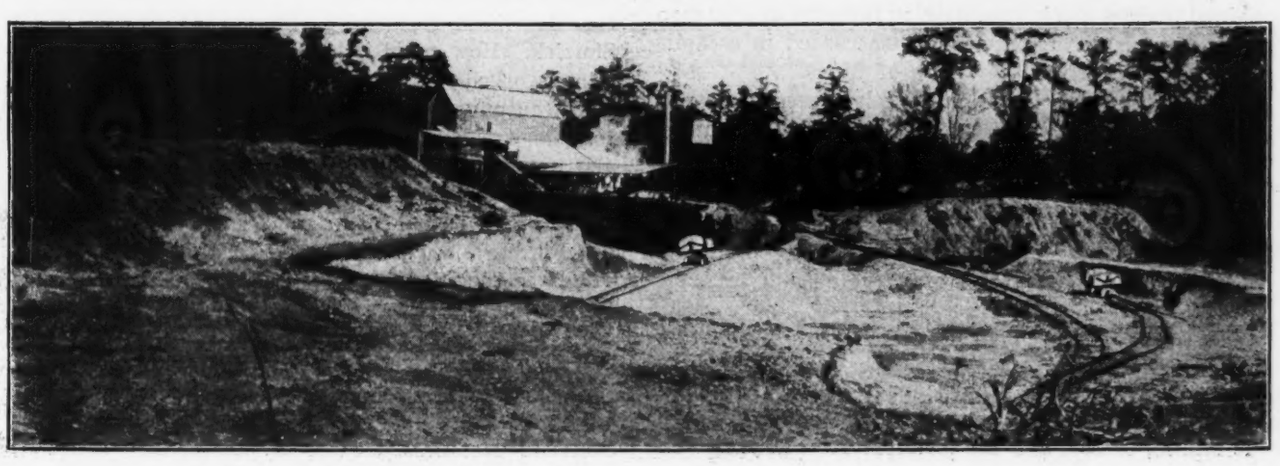


EXPOSURE OF RED BAUXITE NEAR WARM SPRINGS, MERIWETHER COUNTY, GEORGIA



BAUXITE MINE OF THE REPUBLIC COMPANY AT WARM SPRINGS, MERIWETHER COUNTY

KAOLIN MINE AT CLAYMONT, WILKINSON COUNTY



MINE AND MILL OF LESTER CLAY CO., ATTAPULGUS, DECATUR COUNTY, GEORGIA

Belgian Coal and Coke Industry in the War*

A Belgian engineer writes anonymously in "Coal Age" regarding coal and coke production in Belgium, giving interesting details concerning conditions at the mines and coking establishments.

MY ATTENTION was recently directed to Mr. Shurick's article in your issue of June 16, under the heading "The Foreign Coal Markets." I want to offer some remarks concerning the few lines devoted to Belgium in that article. Being unknown to you, I also want to tell you how it is that I am acquainted with conditions in the Belgian coal fields during the German occupation.

I do not want my name to appear in print for the good reason that I have left behind me in Belgium parents and relatives who would certainly be made to suffer for my revealing conditions under which Belgian industries are being systematically crushed and destroyed by the Germans. When the apostles of Kultur are unable to reach a party who has offended them, they never fail to make his friends and relatives suffer in his place, after having first destroyed what property the offending party may have in Belgium or in any other hapless country under German rule.

The Writer Introduces Himself

This being understood, I will introduce myself. I am a byproduct coke-oven specialist, having followed that line of occupation for the last 29 years. I have spent all those years in designing, erecting and operating byproduct plants in Belgium, France, Great Britain and Italy. My residence was in Mons, my business office in Brussels.

There is not a coal or coke plant in Belgium or northern France that is unknown to me. With all the more important, I am thoroughly familiar. I am on friendly terms with 90 per cent. of the chiefs of industries of those countries. With the other 10 per cent. I am at least on speaking terms. At some time or other I have been consulted by nearly all of them. As far as permitted by the restrictions put by the enemy on the free moving of Belgian engineers about the country, I remained in close touch with Belgian industry and its managers until last August, when I succeeded in escaping two full years after the battle of Mons.

During the years that immediately preceded the war, Belgium produced in round figures 24,000,000 metric tons of coal a year. About 1,350,000 tons of this was coked, yielding a trifle more than 1,000,000 tons of commercial coke, including breeze (or braise), sold for domestic use. All coke was of course byproduct coke, as none other has been made in Belgium since 1892 or 1893.

Belgium was a pioneer in the byproduct industry. The oldest byproduct company now in existence is the Société Anonyme du Charbonnage des Produits, at Flénu, Belgium, which was incorporated in 1856 for the mining of coal and the manufacture of byproducts. This company may have become better known abroad as a coal company than a byproduct concern, but this was due to the extraordinarily fine natural condition of its coal deposits, which enabled the company to pay big dividends earned in mining and selling coal while weathering the difficult times it had in developing the byproduct end of its business. But no matter how hard the times, the Produits company never ceased for a single day, since 1856, to make byproducts; and the first aniline colors ever put on the market were made at Flénu by this company at a time when its coke and byproduct department was managed by the noted Belgian chemist Neyrincks.

Germans Not First to Use Byproduct Ovens

With the advent of the Coppée vertical-flue coke oven, the Produits company became quite a factor in the byproduct industry. That was about 1870, at a time when Germany had only beehive coke ovens and when all coke made in Belgium was produced in retort ovens of the original Coppée style. Not only was Germany behind Belgium in getting rid of its beehive ovens, but even to this day there is not in Germany a single coke oven which is not of the vertical-flue kind first invented by Coppée, a Belgian, or the horizontal-flue style developed by Solvay and Semet, the former a Belgian, the latter a Frenchman, both living today. There are many people in this country, even among those in the byproduct industry, who believe that the byproduct oven is of German origin and development. To this day, Belgian coke ovens have always kept at least one step ahead of all others.

At the rate mentioned in Mr. Shurick's article, Belgium in the year 1916 produced roughly 17,000,000 tons. As a matter of fact, the output cannot have been one-half that figure.[1] The tonnage mined up to the time I left the country—that is, during the first eight months, minus two weeks, was less than 4,000,000 tons. The official figure as given out at Brussels for the first six months of 1916 was less than 3,000,000 tons. Having made my escape from the country with only the clothes I had on my back, without either baggage or a scrap of paper, I am unable to give figures except from memory, but I am perfectly sure the half-yearly output in 1916 was not quite 3,000,000 tons. That is 5,500,000 tons less than reported in the article written by Mr. Shurick. How could it have been otherwise, when the mines worked only, on the average, 1½ days a week?

The output would have been even less, had it not been for the very large amount of coal used in coke ovens and gas producers to make gas for the blast furnaces and openhearth furnaces in which were cremated the countless thousands of German corpses brought from the Verdun slaughter that lasted nearly five months. That was the only work our miners ever did cheerfully for the enemy—that is, to go into the mines and dig coal to burn the dead Germans.

It was not because there was no work for them to do that the miners did not work. It was because they did

*Reprinted from *Coal Age* of Oct. 27, 1917.

[1]The figures mentioned in Mr. Shurick's article were expressly designated as "emanating from German sources." They were, further, published broadcast in British technical and trade journals, by which they were apparently accepted as authentic.—Editor.

not want to produce coal that would be used either to keep the enemy's gun factories running or to take the place of coal which the Germans had sold to neutral countries in exchange for provisions, clothing and supplies of which the German armies were in such great need. Many of our miners literally allowed themselves to starve to death rather than do a stroke of work that would be useful to the enemy.

I am not talking by hearsay, as I have seen these things myself. My close association with all those people for nearly 30 years had made me one of them; consequently, I suffered with them, and I know whereof I speak. The deportations of Belgians to Germany (which, by the way, commenced long before reported in America) were made to break the men's refusal to work for their oppressors. It is not necessary to be a profoundly wise economist to understand that the Germans thought that, by removing the Belgians from their homes and the zones in which the American Relief Commission was allowed to operate, the Belgians would be willing to work at anything to save themselves from starvation. Numerous notices were posted notifying the workingmen that they would be sent to the German mines if they persisted in staying away from the Belgian mines. The Germans thought they would thus break what they called the "bad spirit" of those miners.

Belgian Patriotism Persists

The Germans, however, were mistaken in their calculations, as the bad spirit was not broken. It is a matter of record that only 2 per cent. of the men sent to the mines of Westphalia consented to do some work, and very little at that. How many of those unfortunates died of hunger in a foreign land will be known some day; I am sure the figures will be appalling.

As to the coke output, counting the ovens that kept working more or less spasmodically in 1916, the output could not have been more than a paltry 85,000 or 90,000 tons. Practically all the coke plants which thus remained at work were operated by German labor, or rather by all kinds of men of all ages and descriptions, brought from all kinds of countries, some of them as far as Syria and Sinai Peninsula. But even with the few coke ovens that were kept going, they could not be charged regularly, due to the scarcity of coal. It happened (and this was the rule, not the exception) that ovens which ought to have been pushed once a day were pushed only, on the average, once a week.

Since there were more coke ovens in the country than the enemy could keep in operation and since all the Belgian coke ovens are byproduct ovens, of what use would it have been to the Germans to build new byproduct ovens? I know for a fact that not a new oven was built in either Belgium or the invaded part of France after the Germans entered these countries.

Several plants were nearing completion in the Province of Hainaut when the war began. We thought the war would not last over the winter and kept on working to finish the installations. But as soon as it became evident that the war would be long, we stopped all work on these ovens. The enemy took possession of them, announcing his intention to complete them. All they did, however, was to search for the plans of the ovens, which were of a new design. Not finding the plans, they tore the constructions down, brick by brick, measuring everything with the greatest care and reconstructing the ovens on paper.

The plans thus made were sent to the competent authorities in the "Vaterland"; and where the several expensive and nearly completed installations had previously stood, there remained only piles of useless materials. I say "useless," because besides the oven's plans, all the special and expensive brick shapes had been also shipped to the land of Kultur. News of a most reliable character, emanating from a competent authority who succeeded in escaping from the country recently, has reached me, according to which the nearly new batteries of ovens at Hourpes, Genly, Strépy and Bracquegnies have been also razed to the ground, all serviceable material being sent to Westphalia. This was done in the winter and early spring of this year.

Province of Limburg Sufferer from War

As will be seen, this does not tally with the information (evidently supplied by the Teutonic propaganda) that the Germans have constructed byproduct ovens in the hapless country of Belgium. Mr. Shurick mentions[2] the Province of Limburg as the location of these new ovens of German construction. As a matter of fact, the Limburg Province has probably suffered more, comparatively, from German barbarity than any other part of Belgium. The Coppée family—that is, the descendants of the coke-oven inventor—have for a long time contemplated the erection of large byproduct plants in Limburg. It is probable that, had it not been for the war, they would have commenced construction about the end of the present year, in order to have the plants completed early in the spring of 1919.

I have several times discussed the matter with Evence Coppée, the present head of the Coppée family. The idea was to have the ovens ready for the time when the first coal from the new coal field of Limburg would be available. There is a vast new coal basin now in the process of development in Limburg, but the Germans have had nothing to do with this development except possibly to retard it and even to destroy much of what had been accomplished by the ceaseless labor of nearly 20 years. Mine shafts, some of which had reached depths of more than 2000 ft., were being sunk through quicksands by the freezing process. Only a few of the shafts had passed the quicksands, some of them having safely traversed nearly 700 ft. of this dangerous ground.

During the early summer of 1916, the men at all the shafts were corralled by German soldiers at the same time, on the same day, at all the shafts scattered in an area of 31 by 18 miles. Stokers, enginemen, electricians, blacksmiths, carpenters, were packed into waiting trains and sent to Germany without being given time to pick up their dinner buckets. They were told they would not need the pails any more. The refrigerating machines have not made a revolution since then, and all shafts that were not safely past the quicksands have been destroyed forever. Two of these shafts, the property of the Coppée family, had been commenced in March, 1900; they had cost millions and were expected to be finished for coal hoisting at the beginning of 1919. They also had four other shafts that had just reached a depth of 1730 ft. where the head of the quicksand for-

[2]These data were obtained directly from the British technical papers, by which they were apparently accepted as authentic.—Editor.

mation was encountered, when the war began. Evence Coppée decided to wait better times to sink these shafts.

As to the six new mines opened during the German régime in the Province of Hainaut, this is another story of the same kind as that of the Limburg coalfield development. It does not take as long to sink a shaft in Hainaut as it does in Limburg. The record for fast sinking of a shaft in Hainaut is held by the old Belle et Bonne Co., which sank its No. 28 shaft to a depth of 1900 ft. in 5½ years. The favorable conditions encountered at this shaft will probably never present themselves again anywhere else in that region.

The six new mines that, evidently, form the basis of the German story are well known to all Belgian mining men. Work on them was started in 1909 (one shaft), in 1910 (three shafts) and 1912 (two shafts). As the shafts were not producing mines when the war broke out, no coal could be taken out of them; and consequently, the miners had no scruples about working in these shafts.

Work went on uninterruptedly until the German authorities (in December, 1915, or January, 1916) served notice on the different companies owning the shafts that, unless work could be prosecuted uninterruptedly in their producing shafts, the shafts that were sinking would be taken possession of by the military authorities. The miners refused to mine coal for the benefit of their masters, and the six shafts have been stopped ever since. All the machinery was dismantled and shipped to the land beyond the Rhine. The shafts in question are at Monceau-Fontaine, Sacré Madame, Anderlues and Trazegnies.

Nelchina-Susitna Region of Alaska

WASHINGTON CORRESPONDENCE

"Gold occurs from grass roots to bedrock in the Nelchina-Susitna region of Alaska and fine gold occurs in the glacial gravel which covers that region," says Theodore Chapin, of the U. S. Geological Survey. Colors may be found even on the hilltops where no concentration has taken place. Despite the fact that the gold is widely distributed and may be washed in nearly any stream in the region, Mr. Chapin expresses doubt as to its being concentrated sufficiently to justify mining. The only place where any encouragement has come to the limited prospecting that has been done is on Albert Creek, and even there the results have not been such as to attract many miners.

"Even the stream gravels show no definite pay streaks," says Mr. Chapin, "as though there had been but little lateral or vertical concentration since their deposition, which indicates glacial origin for most of the gold. The widespread distribution of the gold through the gravels, and its lack of concentration, show also that it was glacially transported. Its bedrock source is not known. The glacially transported débris was derived from many sources and contained an abundance of rocks foreign to this district, which evidently were moved a great distance. The stream gravels are largely of glacial, fluvial origin and, except for a narrow strip along each stream course, have not been reworked. These conditions account, in part, for the failure to find workable deposits in a region where gold is so widely distributed."

Report of Copper Production

This table is compiled from reports received from the respective companies (except in the cases noted by asterisk as estimated), together with the reports of the United States Department of Commerce as to imported material, and in the main represents the crude-copper content of blister copper, in pounds.

	July	Aug.	Sept.	Oct.
Alaska shipments	8,116,538	3,891,621	8,501,806	.....
Arizona:				
Arizona Copper	nil	nil	nil	.....
Cons. Ariz. Smelting	1,550,000	1,450,000	1,450,000	1,930,000
Inspiration	nil	nil	2,250,000	2,400,000
Miami	nil	260,000	1,900,000	2,673,775
New Cornelia	2,178,619	1,996,587	1,460,936	.....
Old Dominion	nil	875,000	1,225,000	.....
Ray	7,808,766	7,749,509	7,413,881	7,700,000
Shannon	nil	nil	nil	nil
Other Arizona	20,032,410	22,829,806	24,085,753	25,223,854
California:				
Mammoth	1,750,000	1,725,000	1,280,000	1,590,000
Michigan:				
Calumet & Hecla	11,933,433	12,338,735	11,556,438	.....
Other Lake Superior *	8,000,000	8,000,000	7,000,000	.....
Montana:				
Anaconda	12,400,000	11,175,000	2,800,000	22,336,460
East Butte	nil	1,676,360	2,203,300	1,691,008
Nevada:				
Mason Valley	1,316,725	1,417,717	1,267,532	.....
Nevada Cons.	7,253,337	6,439,984	6,524,352	7,000,000
New Mexico:				
Chino	7,343,757	6,824,127	7,719,496	6,333,000
Utah:				
Utah Copper	18,127,154	18,796,012	17,839,378	18,100,000
Eastern smelters *	2,000,000	2,000,000	2,000,000	2,000,000
Total reported	109,810,739	109,445,458	108,477,872	.....
Others, estimated	20,000,000	20,000,000	20,000,000	.....
Total United States	129,810,739	129,445,458	128,477,872	.....
Imports, ore and concentrates, etc	9,484,116	13,447,348	.....	.....
Imports in blister, etc	10,179,095	34,546,504	.....	.....
Grand total	149,473,950	177,439,310	.....	.....
British Columbia:				
Canada Copper Corpn.	nil	212,772	537,229	.....
Granby Cons.	3,147,886	3,836,770	3,321,754	.....
Mexico:				
Boleo	1,411,290	1,433,040	1,454,880	.....
Cananea	nil	nil	nil	nil
Other Foreign:				
Braden	6,015,000	4,512,000	5,348,000	5,414,000
Cerro de Pasco	6,262,000	6,036,000	7,041,000	7,325,032
Chile	6,250,000	8,036,000	3,294,000	9,050,000
Cape Copper	363,759	178,573	nil	.....
Kyshtim	752,640	902,700	.....	.....
Katanga	4,850,120	5,445,360	4,960,350	5,092,625

*Estimated.

The total production of the United States for the first nine months of 1917 was as follows:

January	174,658,603
February	183,859,588
March	192,211,648
April	188,685,898
May	187,750,810
June	173,341,047
July	129,810,739
August	129,445,458
September	128,477,872
Total	1,483,241,663

The grand total, which in the case of July was 149,473,950 lb., includes, under "Imports in ore and blister copper" the production of such companies as Canada Copper, Granby, Cananea, Braden, Cerro de Pasco and Chile. As a matter of record, however, the individual figures are given after the total. We also report the production of the Boleo, Cape Copper, Kyshtim and Katanga companies, whose copper does not come here.

The item "Alaska shipments" gives the official figure of the United States Department of Commerce. Kennecott production June to October was 5,848,000; 3,580,000; 7,048,000; 7,100,000 and 7,116,000 lb., respectively.

Correspondence and Discussion

War Taxes on Mining Companies

An editorial bearing the above title, in the *Journal* of Oct. 27, dealt with the question of depletion allowance as defined by the Commissioner of Internal Revenue, as follows:

> In the case of mines, a reasonable amount for the depletion thereof not to exceed the market value in the mines of the product thereof which has been mined and sold during the year for which the return and computation was made.

The question arises: What is the market value in the mine of the product mined and sold during the year? Apparently there can be only one interpretation of this clause; namely, the difference between the cost of extraction and the selling price of the product, or the net operating profit earned.

To illustrate: If I should make an agreement with a mine owner to take over his mine for one year's operation and should pay him at the end of the year the market value in the mine of the product mined and sold during the year's operation, less a certain percentage for the use of my money, I certainly would pay him the difference between what it cost me to extract the product and the price at which I sold the product, or the net profit, less my commission.

Now, according to a literal interpretation one may deplete an amount equal to his yearly operating profit, and no more. However, if the *Journal* had gone a little further into this ruling it would have found something interesting. For instance, as to the total amount of depletion allowable, the same ruling states: "Provided, that when the sum of the annual allowances for depletion equals the original capital invested, *or in case of purchase prior to Mar. 1, 1913, the fair market value as of that date of the mineral in place,* no further allowance on this account shall be made." The italics are mine.

Apparently not only may one exempt from taxation an amount equal to his total operating earnings for each year, but if the property were acquired prior to Mar. 1, 1913, he may continue to deplete his earnings for each year until he has exempted an amount equal to the "fair market value of the mineral in place on Mar. 1, 1913."

What is the fair market value of mineral in place in a mine on Mar. 1, 1913? If my interpretation of the clause defining the amount of yearly depletion allowable is correct, then the fair market value of the mineral in place on Mar. 1, 1913, would be the difference between the operating cost of extraction and the market price of metals on that date or the net value of the ore in the mine according to operating cost and ruling market prices.

Therefore, in the case of a mining company which had on Mar. 1, 1913, one million tons of 5% copper ore in place, and whose net operating cost per pound was 10c., if the market price of copper was 15c., a fair market value of the mineral in place on that date would have been 5c. per lb. of copper, $5 per ton of ore, or $5,000,000 for the mineral in place, and such a company would be permitted, if it desired so to do, to deplete its total operating earnings for each year until $5,000,000 had been allowed.

Thus it can readily be seen that the only possibility of a company, whose property had been purchased prior to Mar. 1, 1913, paying any income- or war-profit taxes whatsoever during its life, would be (a) that conditions should change so as to make the mineral in place of greater value as taken out than it was on Mar. 1, 1913; (b) metals holding at figures higher than the price of Mar. 1, 1913; (c) the operating costs being reduced below the cost used in the estimate; (d) the grade of ore proving to be better than estimated; or (e) that more tonnage should be developed after Mar. 1, 1913, than was estimated to be in place on that date. However, against these possibilities of a company's paying taxes at some remote period would be (a) the chance that the value of the mineral in place, as taken out, might fall below the estimated value of Mar. 1, 1913, caused by prices of metals being lower than those on that date; (b) by operating cost increasing above that shown in the estimate; (c) by the grade of ore proving lower; or (d) the tonnage in place less. One or all of these causes might result in lowering the net value of the mineral in place as estimated on Mar. 1, 1913, and no taxes would be paid.

If the interpretations of the Internal Revenue Department's rulings above set forth are correct, and the department sees fit to stand by them, then, other things being equal, the stocks of those mining companies whose properties were acquired prior to Mar. 1, 1913, should sell at a premium. The Internal Revenue Department has recognized reserves for depletion and depreciation set aside out of earnings as capital returned. If the reserve for depletion, when the property was acquired prior to Mar. 1, 1913, is to be based upon the net value of the mineral as of that date, instead of the actual investment in the property, how can such depletion reserve be a return of capital? T. O. McGRATH.

Bisbee, Ariz., Nov. 3, 1917.

Formation of Quicklime in Roasting

I am reminded of early troubles at Kalgoorlie, Western Australia, by the article by Walter S. Palmer on "Formation of Quicklime in Roasting Ores from Manhattan, Nevada," in the *Journal* of Sept. 22. The average ore of the "Golden Mile" contained over 70% silica, 6 to 15% lime as calcite, and 2 to 4% sulphur in pyrite. Sulphide ore carried little free gold. Little was known of this ore when the large plants were erected in or about 1900. Long, single-hearth roasting furnaces were built, but they were unsuitable and rarely gave a sweet roast. The ore had a tendency to "run" through the furnaces, and the unwieldy rabble trucks carried raw ore through from the feed to the discharge end, there

dropping it among the roasted ore. From the furnaces the ore passed through revolving coolers and was then banked upon a cooling floor, where it was sprayed with weak solution. The next process was to charge this damp mass into large vats for leaching with cyanide in the ordinary way. This is where the trouble commenced.

During roasting, the lime was changed to the sulphate, and as soon as solution was added and drained off from the vats, there was the finest lot of gypsum imaginable. Percolation was hindered, and the residue, high in gold, had to be "mined" from the vats. Added to this, the solutions deposited $CaSO_4$ everywhere. Introduction of the Edwards and Merton furnaces, and alterations in treatment changed this. These roasters gave excellent results at a cost of 60c. per ton. The trouble with lime was avoided by mixing the hot, roasted ore with solution, which was followed by fine grinding in pans to save the gold freed during roasting, and by agitation and filtration by presses or vacuum machines. The hot solutions deposit gypsum everywhere—on the sides of mixers, pans, agitators, etc.—but this is easily scaled off at the regular monthly overhaul. I have seen White Caps ore from Manhattan, and hope that those in charge will soon give details of their roasting experiences. M. W. VON BERNEWITZ.

New York, Oct. 5, 1917.

Manganese from Low-Grade Ores

The necessity of stimulating the production of manganese, urged at the October meeting of the American Institute of Mining Engineers at St. Louis, was certainly to the point. There is plenty of manganese in the United States for all war purposes, provided low-grade ores are utilized instead of wasted in favor of high-grade ore for the sake of quick cash returns.

I refer to manganese ores that are refused by manganese-ore buyers, and which assay from 13 to 35% manganese. An immense tonnage of such ores is to be had in Nevada and adjoining states. They sometimes occur in union with silver, zinc, lead, tin, tungsten and other metals, which in most cases are wasted partly or wholly through the operation of present methods of "metal finance." I submit herewith results attained in the extraction and recovery of such ores by methods evolved and patented by myself, wherein the manganese recovery may be as high as 99.9%, and is in no case less than 90%. An analysis of the product follows: Manganese peroxide, 99.53%, containing 63% metallic manganese; iron, a trace; lead, none; lime, 0.15%; moisture and loss, 0.32%.

The recovery of the various metals in the ore by my method is shown in the description of a typical case. The ore selected was analyzed with the following results: Mn, 12.20%; Fe, 33.94; CaO, 2.95; Zn, 3.43; Pb, 3.15; Insoluble, 13.65; Ag, 2.35 oz. per ton; Au, 30c. per ton. Analysis of the tailings showed: Mn, 1.2%; Zn, 0.65%; Pb, 0.2%; Ag, 0.3 oz. per ton; Au, 20c. per ton. The following extractions were made: Mn, 90.92%; Zn, 81.17; Pb, 93.65; Ag, 87.24%. The zinc oxide recovered assayed 75.79% Zn; the lead assayed 93% Pb; and the manganese oxide contained 63% Mn, equivalent to a purity of 99.53%.

The solvent used was sulphurous fumes, either those generated by calcining sulphide ores or raw sulphur or eliminated as waste gases. Deposits of ore ranging in manganese content from 5 to 35% occur in various localities, and the manganese, with the other metals such as silver, zinc, etc., can readily be recovered by means of sulphurous acid generated from roasting sulphide ores usually to be found near-by. Sulphurous acid will, in the case of manganese, make a better and cleaner extraction than sulphuric acid, which is more expensive and indispensable for other purposes.

Manganese-silver ores readily yield their metallic contents to this treatment although it is hard to interest capital. The erection of a 5- to 10-ton experimental plant by the Government, to treat low-grade manganese ores by this process, would establish the efficacy of the method and might induce mining men and capital to develop this heretofore neglected branch of our mineral industry. C. S. VADNER.

Reno, Nev., Nov. 3, 1917.

Mill Check on Mine Sampling

The sampling work as conducted by a certain copper company in Morenci, Ariz., is of considerable interest. For some months previous to the labor strike in 1915 this company was milling several thousand tons of ore per day assaying about 2% copper and was taking about 2000 samples per month, consisting of channel cuts, rough grooves and grab samples. The channel cuts were taken horizontally on each side of all drifts and crosscuts in the low-grade porphyry orebodies, the rough grooves at 5- or 10-ft. intervals in the stoping-width veins and irregular limestone deposits, and the grabs were taken daily in every drift, raise and stope working in ore. A shovel grab was also taken from the top of every 10-ton mine car dumped into the main shaft pocket tributary to the concentrator; all carloads were weighed and periodic moisture determinations made. A continuous sample of the crushed mill feed was also taken at the concentrator by an intermittent whole-feed automatic sampler. All samples were assayed for copper by the slop-copper method except the mill sample, which was determined by the electrolytic method. The former determinations were reported only to the nearest tenth part of 1% and the latter to the nearest hundredth. All mine samples were cement-sack size.

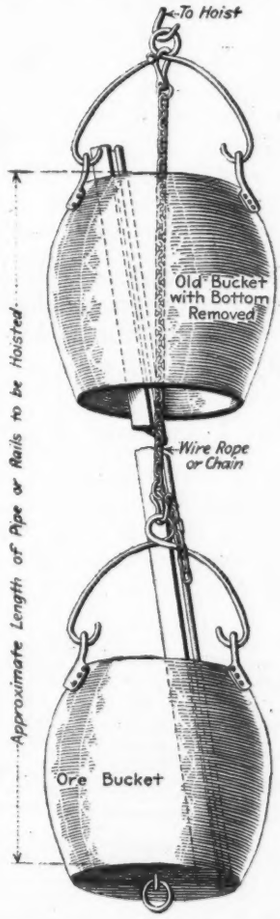
At the end of each month the daily mill-feed samples were weighted and the average was carried to three decimal points. The grabs taken at the loading pocket were weighted according to the dry tonnage hauled underground and checked against the mill feed. A third check was made by averaging the daily grabs from each working face, weighting the samples according to the shiftbosses' corrected car reports from all workings. Averages of the last two series were carried to the nearest hundredth. Month after month the variation in the above three averages would be under 0.05% and many months it was as close as 0.02%. The degree of accuracy implied by these averages is almost uncanny and is probably largely due to the size and great number of samples taken of a grade seldom varying more than 1% from a mill feed averaging 2%, which in itself is low grade. An experimental "pilot mill," treating all development ore, should give a good sample of a disseminated low-grade orebody. J. W. MAXWELL.

New York, Sept. 23, 1917.

Details of Practical Mining

Method of Hoisting Rails and Pipe

A safe method of hoisting and lowering rails and pipe without the trouble of lashing the upper ends to the hoisting cable is used in Gilpin County, Colo., and is shown in the accompanying illustration. The device consists of two buckets. The upper, preferably an old one with the bottom removed, is suspended from the hoisting cable in the usual manner and an ore bucket is hung at the desired distance below. The space between the bottom of the lower bucket and the rim of the upper one should



HOISTING RAILS OR PIPES

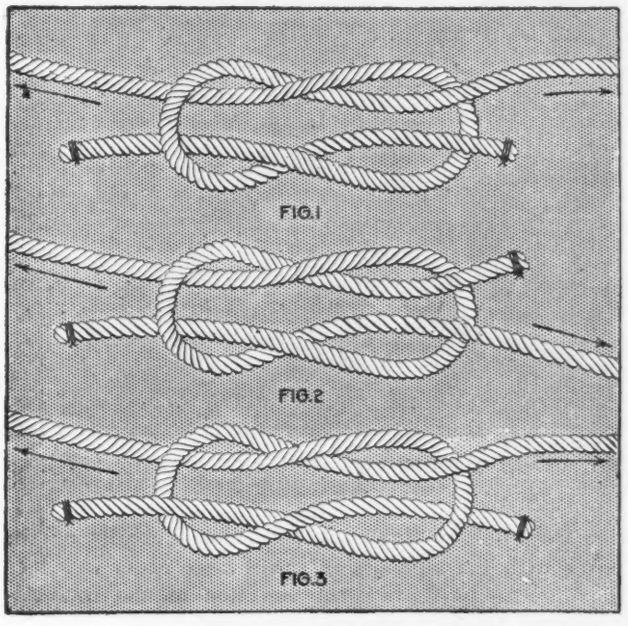
be approximately the length of the pieces being hoisted. In loading, the pipes or rails are shoved up through the upper bucket far enough to permit the lower ends to be dropped into the lower one. When loaded the material may be hoisted without any lashing and without danger of accident. Lengths of rail or pipe that can be handled at the shaft stations may be hoisted or lowered safely in this manner, and the method is especially convenient when a large number of pieces are to be handled at one time.

The method should be applicable at Joplin, Mo., where buckets are extensively used and are made easily detachable.

Deceptive Similarity in Knots

A description of an unusual knot called the "thief" is given in a small handbook on military work, and that is the only place I have been able to find it mentioned, writes O. R. McBride in *Power*. While it is likely to be tied by chance only, the fact that it is possible to do so and if it is trusted to hold will cause somebody grief seems sufficient reason for calling attention to it.

Fig. 1 shows the ordinary square or reef knot. Fig. 2 shows the "thief"—presumably so called because it looks so much like the square knot, so well-known and reliable. I have called the attention of more than a dozen engineers, structural men and riggers to the "thief" and failed to find one who had ever seen it described;



ONE GOOD AND TWO BAD KNOTS

Fig. 1—The square knot. Fig. 2—The "thief." Fig. 3—The granny or rolling knot

most of them thought it would hold, but a trial soon showed that it would slip. The difference is entirely in the point of pull, which is on the same side or half of the knot in one and on the opposite sides in the other. The way in which the "thief" is most likely to be tied is when one bend or bight is made and the other end threaded through it. Fig. 3 is the "granny" or rolling knot and, like the "thief," will not hold. The difference between this and the square knot is that when the ends are brought back for the second half of the knot, they are crossed over. All that needs to be remembered in tying a square knot is to bend the ends back on the same side as they occur after the first half of the knot is made, so that the rope and the end lie on the same side of the loops. To avoid the "thief," see that the pull comes on the lines on the same side or half of the knot.

String Line Stakes To Prevent Mix-up

The numbered line stakes carried by the South African axman shown in the photograph, says G. T. Ritchie, in *Engineering News-Record*, are strung on thin wire. Not only are they convenient to carry in

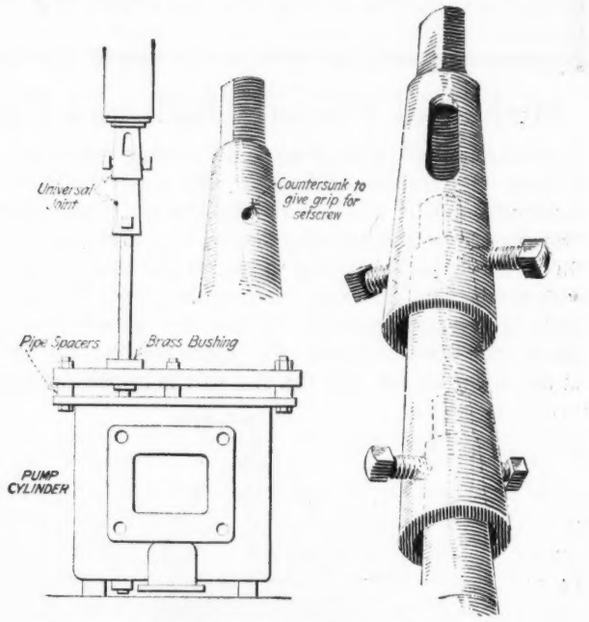
SOUTH AFRICAN AXMAN CARRIES LINE STAKES STRUNG IN ORDER ON WIRE

this way, but by threading them consecutively on the wires with the numbers in the inverse order in which they are to be driven, the selection of the correctly numbered stake is rendered foolproof.

Reboring Pump Cylinder on a Drill Press

In an isolated plant the steam cylinders of a 7 x 10 water pump became badly scored, and the question arose how to make a quick repair with comparatively small resources. The double-cylinder casting was too big for the lathe, and a portable boring tool could not be had earlier than 12 days. Anyway, the owners would not go to such an expense for the comparatively small job. How the reboring was successfully done on a drill press is told by L. V. Lauther in *Power*. A heavy cast-iron plate was securely fastened, with bolts through pipe spacers, on the head end of the cylinder, and a bushing was fitted into the stuffing-box and centered, forming a neat sliding fit for the boring bar, which was driven by the drill-press spindle and the feed adjusted to suit the cut.

The two loose-fitting sockets driven by setscrews formed a universal 2-joint coupling. When one cylinder was done, the plate was reversed and the other one bored in the same way. The job took 19 hours,

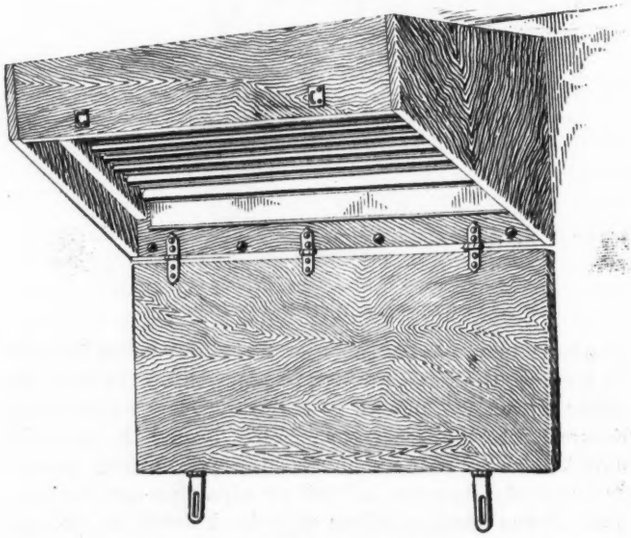


BORING BAR DRIVEN WITH DRILL PRESS

but with practically no expense for material, the only particularly difficult or tedious operation being the setting of the boring bar true, as it had to be centered from the counterbore.

Exhibition Case for Large Maps

An adaptation of library or school practice may be found in the accompanying sketch, designed to show a serviceable exhibition case for large maps or drawings. These are mounted on shade rollers of the proper length and hung in a wooden case, as shown in the perspective



EXHIBITION CASE FOR LARGE MAPS

sketch. Hinges and locks may be provided if a door is wanted on the front of the case and the contents are not for the public view. The height of the case from the floor is determined by the length of the maps.

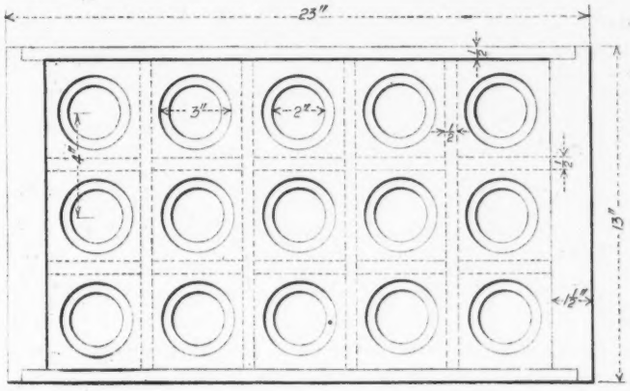
The Assayer and Chemist

Racks for "Slop Copper" Flasks

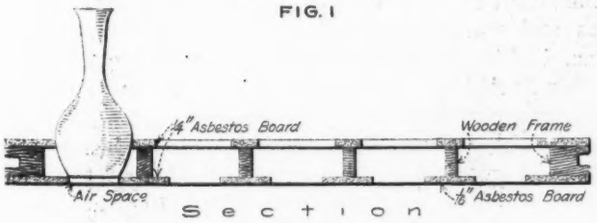
BY H. D. HUNT*

A handy "kink" in the manipulation of the cyanide method was developed in the Miami copper laboratory some time ago by F. C. O'Brien. It consists of sets of decomposing trays and drying racks for the flasks by the use of which handling of individual flasks is almost entirely eliminated and much time is saved. The decomposing tray (Figs. 1 and 2) consists of a wooden frame covered both top and bottom with ¼-in. asbestos board. Circular holes are cut in the top to allow the flasks to pass through the asbestos but still to fit snugly. In the bottom strip of asbestos, smaller holes are cut on the edges of which the flasks rest, having air space between them and the hot plate. If the temperature of the hot plate is high, the entire bottom of the tray is covered with $\frac{1}{16}$-in. asbestos as shown.

The drying rack is made entirely of wood with holes corresponding exactly to those in the decomposing tray.



Plan
FIG. 1

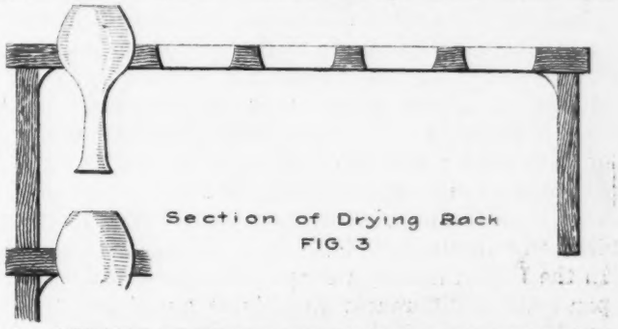


Section
FIG. 2

DECOMPOSING TRAY USED IN MIAMI LABORATORY

The supports are long enough to allow several racks to be stacked one upon the other. A convenient place to dry and store the flasks and racks is in a closet under the hot plate. This can be fitted with guides and the racks placed on these guides. The flasks are then out of sight and out of the way when not in use.

Manipulations with racks and trays are few and simple. After washing, the flasks are inverted in the racks and allowed to drain. When needed, a tray is placed over the flasks in the rack so that the bottoms of the flasks enter the holes in the tray. The rack and tray are then inverted together and the rack lifted off leaving the flasks upright in the tray. The samples are then weighed into the flasks, acid added and the tray placed upon the hot plate. After decomposition, water and



DETAILS OF TRAYS AND RACKS FOR FLASKS

ammonia are added to the flasks while still in the tray. The only handling of individual flasks is in transferring them to the burette rack, in titrating and in washing and placing the flasks in the drying racks. In this laboratory the trays are made to fit the 14 x 24-in. hot plates. Each tray holds 15 flasks and all samples are run in sets of 15. A standard ore is run in the middle flask (No. 8) of each set and the factor so determined is used for the entire set.

*Miami Copper Co., Miami, Ariz.

Assay Conversion Tables

BY A. W. ALLEN*

The following table will be found convenient in the case where assay results are reported to the home office in troy ounces per ton (of 2000 lb.) and where separate records must be kept, for official inspection, in grams per 1000 kg. Most English-speaking mining companies operating in Latin America use the short ton in metallurgical calculations, especially where contents are reported in ounces per ton; and as bullion is usually ultimately sold by the troy ounce, it is only natural that the assay-ton system should be used in calculating.

TROY OUNCES PER TON AND GRAMS PER 1,000 KILOGRAMS[1]

Oz.	Grams	Oz.	Grams	Oz.	Grams	Oz.	Grams	Oz.	Grams
1	34.2859	21	720.0039	41	1405.7219	61	2091.4399	81	2777.1579
2	68.5718	22	754.2898	42	1440.0078	62	2125.7258	82	2811.4438
3	102.8577	23	788.5757	43	1474.2937	63	2160.0117	83	2845.7297
4	137.1463	24	822.8616	44	1508.5796	64	2194.2976	84	2880.0156
5	171.4295	25	857.1475	45	1542.8655	65	2228.5835	85	2914.3015
6	205.7154	26	891.4334	46	1577.1514	66	2262.8694	86	2948.5874
7	240.0013	27	925.7193	47	1611.4373	67	2297.1553	87	2982.8733
8	274.2872	28	960.0052	48	1645.7232	68	2331.4412	88	3017.1592
9	308.5731	29	994.2911	49	1680.0091	69	2365.7271	89	3051.4451
10	342.8590	30	1028.5770	50	1714.2950	70	2400.0130	90	3085.7310
11	377.1449	31	1062.8629	51	1748.5809	71	2434.2989	91	3120.0169
12	411.4308	32	1097.1488	52	1782.8668	72	2468.5848	92	3154.3028
13	445.7167	33	1131.4347	53	1817.1527	73	2502.8707	93	3188.5887
14	480.0026	34	1165.7206	54	1851.4386	74	2537.1566	94	3222.8746
15	514.2885	35	1200.0065	55	1885.7245	75	2571.4425	95	3257.1605
16	548.5744	36	1234.2924	56	1920.0104	76	2605.7284	96	3291.4464
17	572.8603	37	1268.5783	57	1954.2963	77	2640.0143	97	3325.7323
18	607.1462	38	1302.8642	58	1988.5822	78	2674.3002	98	3360.0182
19	641.4321	39	1337.1501	59	2022.8681	79	2708.5861	99	3394.3041
20	685.7180	40	1371.4360	60	2057.1540	80	2742.8720	100	3428.5900

[1]Equivalents of the fractional parts of an ounce (per ton) in grams per 1000 kg. are as follows: 0.1 oz., 3.4286; 0.2 oz., 6.8572; 0.3 oz., 10.2858; 0.4 oz., 13.7144; 0.5 oz., 17.1429; 0.6 oz., 20.5715; 0.7 oz., 24.0001; 0.8 oz., 27.4287; 0.9 oz., 30.8573.

*Metallurgical engineer, 309 Broadway, New York.

Events and Economics of the War

The Italian army, after efforts to stem the Teuton invasion at the Tagliamento and Livenza rivers, is resting on the broad Piave River, where the two armies are now opposed; British and French aid is on its way. General Diaz has assumed command in Cadorna's place. In Russia, a revolt of the Bolsheviki in Petrograd under the leadership of Lenine was temporarily successful, but is assuming less importance as the loyal elements rally to the support of the Provisional Government. In Flanders, Canadian troops took Passchendaele and pushed a mile beyond. The creation of an Allied war council through which the Allies may act as a unit is again demanding consideration. Gaza, Askalon and Beersheba have been taken from the Turks by the British in Palestine.

In the United States, a compact has been made with Japan settling differences on Chinese questions. Germany has been asked to agree on the treatment of war prisoners. Strikes among shipworkers have been settled; Charles Piez of Chicago, president of the Link-Belt Co., has supplanted Rear Admiral Capps in supervising construction under the shipping program. The U. S. S. *Alcedo*, a converted yacht, was sunk by a torpedo, 21 of the crew being reported missing. The President has proclaimed that on and after Nov. 15 it will be unlawful to manufacture, distribute, store, use or possess explosives or ingredients thereof, except as provided in the Explosives Act.

Germans Destroy Belgian Plants

Details of Germany's systematic destruction of manufacturing plants in Belgium continue to reach the Belgian government, according to information from Havre. All machines and belting have been removed from the Deprez-Vassaat works at Herstal (Liège). In the district of Huy, the Wanze cement plants and the Régissa, Marchin and Barte works (zinc, plates and rolling mills) are shut down by German order. Factory brasses, and boilers from breweries, etc., have been removed and sent beyond the Rhine. At the Glacerie Saint-Roche, at Auvelais, brasses have been confiscated and other machine parts useless to the Germans, such as spare supplies, broken up. All machinery has been stripped from the Heuze works—as well as the electric cables and belting.

Organized wrecking crews have been dismantling blast furnaces, two of those of the John Cokerill Works, near Liège, having been completely destroyed. Engines, machinery and stocks of raw material are being removed. Seven of the eleven rolling mills at Ougree-Marihaye have been carried off. At Angleur everything has been removed, as at Grivegnee, where nothing remains but the steel works, which the Germans are operating to supply their own needs.

German requisitions for pit coal (from 36 to 90% of the total production), threaten to deprive the population of the occupied territory of all fuel during the coming winter. A paradoxical effect of the manner in which the Germans wage war is that the inhabitants of what is normally a coal-exporting country should be shivering before their empty fire places alongside shafts from which thousands of tons of coal are being taken every day. To make up for this want of coal, the Community Council of Anderlecht-les-Bruxelles has been constrained to grant 100,000 francs to the local aid and food committee to buy firewood; though Anderlecht is joined by rail, water and highway to the Charleroi district (45 km.) and to Borinage (50 km.), both large coal-producing centers.

Hoover Practically Food Dictator

The schedule of regulations made public by President Wilson on Nov. 3, authorizing Herbert C. Hoover to license importers, manufacturers, wholesalers, canners, packers and large retailers, and giving him almost unlimited control over the prices and distribution of the nation's fundamental foodstuffs, practically confers upon the Food Administrator all the authority of a dictator. It is said, however, that the policy pursued will be to obtain results so far as possible by voluntary coöperation. The regulations, which are an elaboration of the powers granted by the Lever Food-and-Fuel Act of Aug. 10, make it mandatory that the commissions of middlemen and the profits of wholesalers in certain commodities shall be no more than normal and in no case unfair; that there shall be no storage of foodstuffs beyond requirements for 60 days; that no licensee shall sell in quantities known to be in excess of the requirements of the purchaser; that there shall be no sales to firms coming under provisions of the licensing system but who have not been granted licenses; that commission merchants shall not sell to themselves, making a commission and a profit besides, and that grain elevators and warehouses shall at all times be at the command of the Food Administration. The regulations will be enforced, if dealers refuse to conform to their provisions, by withdrawal of the dealers' licenses, without which they will not be allowed to continue business.

A regulatory edict of the Government of far-reaching importance will become effective on Dec. 10, when the country's baking industry will be put on a war basis. After that date loaves of standard sizes only may be baked, and the industry must accept a formula prepared by the Food Administration. While the mixing of other cereals with wheat—a policy adopted in France and England—will not be insisted on, the new war loaf will differ in many respects from that which is baked at present. The Food Administrator believes that a saving of 100,000,000 lb. of sugar and an equal amount of lard will be effected within a year.

The acceptance of "returns" by bakers also will be forbidden, and it is estimated that this action will mean an annual saving of at least 600,000 bbl. of flour. Seven cents a pound for bread under the new con-

tions is the present mark set where elaborate delivery and credit systems are abandoned. The people will be asked to coöperate in an effort to reduce these overhead charges to a minimum. Authority to proceed under a licensing system which will make it possible to put these regulations into effect has been given to the Food Administration by President Wilson. Bakers will be classed as manufacturers, thus bringing them within the scope of the Food Control law. The bakers will thus have a month in which to adjust their plants to the new conditions.

Priority Order for Western Roads

Seven railroads serving coal mines in the Utah and Wyoming fields have been ordered by Judge Robert S. Lovett, in priority order No. 3, to supply daily to such mines all or so many of the empty box and single-deck stock cars moving west or northwest over their lines as may be required to transport coal ready for shipment west or northwest, according to the direction in which such cars are being moved. The companies have, furthermore, been ordered to transport and deliver all cars of every kind loaded with commercial coal and destined to points west and northwest of point of shipment in such manner that they shall have preference and priority in shipment, after transporting (a) railroad fuel supply; (b) live stock and perishable freight, including sugar beets; (c) Government shipments, and (d) commodities to and from smelteries sufficient to keep same in operation. The railroads named are the Denver & Rio Grande Railroad Co., San Pedro, Los Angeles & Salt Lake Railroad Co., Utah Railway Co., Union Pacific Railroad Co., Oregon Short Line Railroad Co., Southern Pacific Co., and Western Pacific Company.

Brotherhoods Want Shorter Trains

The four railroad brotherhoods that forced the enactment of the Adamson eight-hour law a year ago have announced their intention to urge on Congress, when it convenes again, legislation limiting the load of freight trains. This is ostensibly in the interest of safety. But railroad men at Washington who have been directing the Government's war-efficiency work assert that such a law would paralyze the internal commerce of the country and jeopardize the fate of the armies at the front.

The whole campaign of the Railroads' War Board, which has resulted in hauling 20% more tonnage in 1916 with only a slight increase in cars and locomotives, has been directed to increasing the train load. In April the average train load was increased to 738 tons; May to 793 tons, and July to 783 tons. By making two trains do the work done by three in 1910, the War Board has accomplished the same result as if it had put thousands of new locomotives and scores of thousands of new cars on the rails. These have been the means of saving enormous quantities of labor and materials for the pressing needs of our Allies, especially in rebuilding Russian and French railroads. Now, with this accomplished the labor chiefs have planned a blow which railroad managers say would seriously cripple the service.

Legislative agents of the "Big Four" brotherhoods for several years have been introducing short-train bills in every state legislature. In only one state, Arizona, have they forced legislation. The bill they have now drawn and behind which the four brotherhoods are to exert all their efforts would limit all trains to 50 cars. The brotherhoods' agents have decided it is a waste of time to conduct a campaign in 48 states when one national law will cover the country.

Food and War Supplies Cached in New York

Huge quantities of food and war materials hoarded in the New York metropolitan district have been unearthed by the U. S. Secret Service, which was recently instructed by the President to aid the Food Administration in enforcing the provisions of the Food law. Supplies thus far discovered are estimated at over $75,000,000 in value, more than $35,000,000 of which is represented in steel, copper, leather, oils, cotton, jute, etc. Seizure of the food, which is possible under the law, will depend on the decision of the Food Administration and other war boards charged with the control and disposal of war supplies. Much of the steel, copper and jute is held by German interests, according to the *Times*, in particular some closely allied with the Deutsches Bank of Berlin. Part of the material is said to be owned by profiteers. The Alien Property Custodian, A. Mitchell Palmer, is prepared to seize these supplies wherever enemy ownership is proved.

Link Belt President Succeeds Capps as Shipbuilder

The executive functions hitherto administered by Rear-Admiral W. L. Capps, general manager of the Emergency Fleet Corporation, and by Naval Constructor A. D. Bolles, his assistant, are to be taken over by expert civilians. Charles Piez of Chicago, president of the Link Belt Co., has assumed entire charge of the shipbuilding program under E. N. Hurley, chairman of the Shipping Board, displacing Admiral Capps insofar as these duties are concerned, but not assuming the title of general manager. Admiral Capps has denied that he will resign, saying that he will continue to work in coöperation with Chairman Hurley. Mr. Piez was elected vice president of the Emergency Fleet Corporation about Nov. 1 in preparation for his appointment. While having general supervision of construction, he will give his personal attention to steel construction. James Heyworth, a Chicago contractor, will direct construction of wooden ships, of which there are 310 building, and also will supervise the building of the ships on the stocks which were taken over by Chairman Hurley's commandeering order. These duties heretofore have been administered largely by Naval Constructor Bolles.

Three other appointments of importance were those of A. J. Mason, a Chicago engineer, who will have the position of field inspector for the Fleet Corporation, visiting the various shipyards to see that they are maintaining their maximum efficiency and that they are kept supplied with labor and materials; Charles Day of Phil-

adelphia, who will act as a consulting engineer, and John B. Payne of Chicago, who will be chief of the Fleet Corporation's local counsel.

The reason assigned for the change is that the construction work was being administered with a complete absence of business methods; that there was not the harmony existing between the officials of the Emergency Fleet Corporation and the builders that should obtain in order to bring out the maximum production and the best results in other respects; that the builders were held back for days and weeks because they could not get materials with which the Fleet Corporation was undertaking to supply them and that the builders were kept in an uncertain state because a decision by the Fleet Corporation on ship design or related matters on one day might be reversed the next.

Coal Pooled at Eastern Ports

The Tidewater Coal Exchange has been formally approved by the U. S. Fuel Administration, and an order has been issued requiring all transhippers of coal at New York, Philadelphia, Baltimore and Hampton Roads to make shipments through it. Practically all shippers to these points have been doing this since the exchange was organized some time ago. The few remaining outside, however, prevented the attainment of 100% efficiency in operation, which could not be reached unless all were members.

The new order will result in increased production of approximately 10,000,000 tons of coal per year, on account of the decrease in detention of cars at the ports, thus increasing the supply of cars to the mines. Coal will be pooled and classified according to grade, and the number of consignees has been reduced from 1000 to 50. Vessels have also been pooled at some of the ports, and this, with arrangements for bunkering in the stream, will facilitate the unloading of cars and loading of vessels.

Britain's Control of Labor Supply

The British Ministry of Munitions has direct control over most of the manufacturing which is now being carried on in England. The remarkable success of the war industry of Great Britain has been due in great part to the work of this Ministry. The English manufacturers have found that most of their serious problems of production were caused by the great changes in the supply and character of labor available for industry during the war period, as is the case at the present time in this country. For this reason, the labor supply department of the Ministry of Munitions proved to be of the greatest importance.

Members of the Ministry's special commission, which is headed by Sir Stephenson Kent, director-general of the labor-supply department, have been in Washington for a month giving the heads of Government departments, the Council of National Defense and the American Federation of Labor the benefit of England's experience of industry during the war. The conference at Washington proved to be so valuable that the Commission was urged to visit the important industrial sections in this country, that manufacturers and other employers, as well as employees, might also benefit. It has already visited St. Louis, Chicago, Pittsburgh, Cleveland, Buffalo, Boston and New York. Attendance at the conferences has been large in all these cities.

Americans in Paris War Conference

The American commission to the Allies' war conference, begun in Paris on Nov. 15, is headed by Col. E. M. House and includes Admiral W. S. Benson, chief of naval operations; Gen. Tasker H. Bliss, chief of staff, U. S. A.; a representative of the Treasury in the person of Assistant Secretary Oscar T. Crosby; Vance C. McCormick, chairman of the War Trade Board; Bainbridge Colby of the Shipping Board; Dr. Alonzo E. Taylor of the Food Administration; Thomas Nelson Perkins, representing the Priority Board, and Gordon Auchincloss, as secretary. In outlining the objects of the conference, Secretary Lansing said in part:

> The conference is essentially a war conference, with the object of perfecting a more complete coördination of the activities of the various nations engaged in the conflict and the more comprehensive understanding of their respective needs in order that the joint efforts of the cobelligerents may attain the highest war efficiency. While a definite program has not been adopted, it may be assumed that the subjects to be discussed will embrace not only those pertaining to military and naval operations, but also the financial, commercial, economic and other phases of the present situation which are of vital importance to the successful prosecution of the war.

Jailed for Tungsten Plot

Convicted of attempting secretly to export powdered tungsten to Sweden, three men were sentenced at New York, on Nov. 9, to one year and a day each in the Federal prison at Atlanta, Ga., and each was also fined $1000. The men were Fritz Oerundal, formerly chief steward of the liner "United States," and Waldemar J. Adams and Robert J. Collin, Swedish booksellers, of New York. Oerundal is a Dane, Collin a subject of Sweden and Adams a naturalized American citizen.

They have the lenient American laws to thank for this light penalty, says the *Sun*. They confessed to a scheme to ship secretly from this port a large quantity of tungsten which is wanted badly in Germany. The trio had no patriotic motives, for they were neutrals. Desire for money alone impelled them to hide beneath a stateroom floor on the liner "United States" 40 large packages of the metallic powder, exportation of which has been forbidden by the President. They admitted having conspired with two other men now in Sweden to delude the American customs authorities and the British Admiralty.

Solve Trench-Digging Problem

The trench-digging problem has been solved, according to the U. S. Field Artillery *Journal*. Machinery designed originally for pipe-line excavation, for instance, may with little modification be employed for the defense of a nation. Ditch diggers can cut trenches at a rate of three yards a minute. These are a yard across the top and 12 ft. deep, and they not only make a perfect trench at one cut, but grades can be maintained accurately and curves negotiated.

Industrial News from Washington

By Paul Wooton, Special Correspondent

Mexico Has No Gold Commission in This Country

Contrary to published reports, there is no commission in this country for the purpose of arranging for the shipment of gold into Mexico as a privilege under the embargo recently established by the United States, says a statement authorized by the Mexican Embassy. Some time ago the American authorities were asked to allow the transfer of $5,000,000 monthly to enable the mining and oil companies in Mexico to meet obligations in that country payable in United States coin. Not only was this request granted, but the amount was doubled, $10,000,000 monthly being the total specified, the statement says.

In addition to this the American Government voluntarily offered to permit a large amount of silver pesos to be shipped into this country, where they will be exchanged for gold and returned to Mexico. The Mexican government has notified all gold-mining companies in that country that the national mint is open for the coinage of all gold bullion that they may desire to have so treated. This also will tend to ease the situation. The "commission" now in this country for the purpose of handling the gold question is merely a private committee of the Chamber of Commerce entrusted solely with the duty of purchasing coin, for which it pays in gold.

Western Metallurgy Advancing

After several months of almost constant travel on visits to mining districts and treatment plants throughout the West, Dr. F. G. Cottrell, chief metallurgist of the U. S. Bureau of Mines, has returned to Washington impressed with the effective manner in which the metal-mining industry is rising to the existing emergency. He found the entire West striving to meet the abnormal demand for minerals, and was particularly impressed with the determined way in which the large interests are pushing their enterprises. He specifies in particular the work in progress at Anaconda and the decision to erect a $25,000,000 steel plant at Seattle.

The metalizing of iron for the precipitation of copper in connection with leaching, while still being conducted on an experimental scale, is attracting wide attention, according to Dr. Cottrell. Interest in making sponge iron has been re-awakened as a consequence. Since looking into the matter personally, he is thoroughly convinced of the seriousness of the arsenic situation. The fact that all in a position to produce arsenic know that the Anaconda catchment plant will be turning it out on a large scale, probably within the next year, discourages the installation of other plants.

Dr. Cottrell observed with interest while on his trip the extensive steps that are being taken to manufacture chemicals at plants around Salt Lake City. Another matter to which he attaches special importance is the installation of additional equipment at cement plants to recover potash; also the amount of potash that is being recovered from bitterns and the progress that is being made toward the production of cyanide.

Western Tungsten Resources Inventoried

An inventory of the tungsten resources of the Western states has been made by F. L. Hess, of the U. S. Geological Survey, on a nine months' trip just finished. A feature of the tungsten situation, according to Mr. Hess, is the great number of contact-metamorphic deposits, which he expects to be an important factor in future production. The mineral collection in the National Museum at Washington will soon receive from the Atolia Mining Co., of Atolia, Calif., a single piece of scheelite, 5 ft. high, 2 ft. wide and 1½ ft thick, recently mined by that company. Mr. Hess, who visited the property, suggested that the remarkable specimen be preserved and succeeded in obtaining it for the museum.

He also examined a large number of molybdenum and vanadium deposits, visited several iron properties, investigated reported finds of potash and inspected the cobalt property of the Haynes Stellite Co. at Blackbird, Idaho. This is the first cobalt deposit to be operated as such in the United States, Mr. Hess believes. A mill has been erected and preparations made for treating the ore on a large scale. Several hundred new molybdenite developments were noted, the largest production coming from the tailings of the old Mammoth gold mine, at Schulz, Ariz. More than 500 tons have been obtained from this source, and the mine itself has been reopened.

High Price of Cement Justifiable

Complaints are reaching Washington from various sections of the country that cement prices are unreasonably high. Government specialists who have looked into the situation, however, believe that though some of the manufacturers may be attempting to recoup previous losses, cement in general is being sold at the mills at a fair price. The cost of manufacture under present conditions, it is pointed out, is high, having increased more in this particular industry, it is believed, than in any other, due largely to the fact that the machinery used wears out rapidly. Replacements are not only expensive but result in delays which curtail production. The industry, furthermore, uses quantities of explosives and is also subject to the existing increased costs of fuel and labor. Car shortage, too, has added to the tribulations of the cement manufacturer. While there has been considerable comment concerning division of territory by cement makers, this should not be held responsible for increase in price. It has, on the other hand, made possible economies in selling and in reducing transportation charges.

Editorials

Taxation of Mining Companies

T. O. McGRATH, auditor of the Shattuck Arizona Copper Co., presents in an interesting communication published in this issue a different view of the allowance to mining companies for depletion according to the terms of the present income tax law; that is, different from the view expressed in an editorial in the *Journal* of Oct. 27. We agree with Mr. McGrath that this matter of depletion may be a much more jumbled affair than was set forth in our editorial. The language of the provision in the law exhibits the same imperfect comprehension of matters of business that is displayed in many other parts of the law. There is a similarity between the work of our Congress and that of the Bolsheviki in Russia.

In cases of confusion in the written law the courts give a good deal of weight to what was the manifest intention of the legislators. In the present case we think that there is no doubt that the manifest intention was to recognize that the dividends of a mining company are to a large extent nothing more than return of principal invested in the company and therefore ought not to be taxed as income. As to just how the allowance ought to be made, or was to be made, Congress had no clear idea. It thought, apparently, that mines ought to be valued as of Mar. 1, 1913, and that the principal represented by such valuation ought to be permitted to come back to its owners tax-free; but in order that there should be no attempt to deduct too much in any one year the allowance was limited to the percentage of the orebody that might be extracted in any year. Valuation as of one day is of course something that is apt to be highly unjust, as it would have been if the price for copper on Mar. 1, 1913, had been 12c. per lb. Fortunately, the price for copper on that day was 14.55c. per lb., which is only a trifle below the decennial average at that time; but, of course, in the light of what has happened since, it is doubtful whether such a figure is a proper one.

Anyway, the value of a mine having been determined, and the manifest intention of Congress being to let the owners liquidate it free of taxation, the computation really resolves itself into the primary factors of mine valuation; namely, the net interest that should be allowed on a mining investment and the period of time during which the orebody is going to be extracted. We do not think, as Mr. McGrath intimates, that the Bureau of Internal Revenue will allow all net income to be considered as a return of principal. We think the chances are rather that it will take the view expressed in our editorial of Oct. 27. Even so, mining companies will obtain an important exemption from taxation on their income as commonly reported. Of course, that is nothing more than right, for the income commonly reported is always something more than net income, and being partly a return of capital the mining company would be taxed first on its capital and then again on the liquidation of the same capital were it not for an allowance for depletion.

While we are on the subject of taxation of mining companies we may draw attention to the fact that while holding companies may not include in their capital their investments in other companies, on the other hand they do not have to include in their income the dividends received by them from such investments.

Mining Engineers in Service

THE part that mining engineers are playing in the military service of the United States, both in the line and in the staff, and also in the industries that are the foundation of everything, is an important one. Several of our good friends are officers in the 11th Engineers, which was one of the first regiments to go to France. Another group is forming the 27th Engineers, the special mining regiment. Many other well-known mining engineers are scattered among the line regiments.

In the United States Naval Consulting Board mining engineers are bountifully represented. Herbert Hoover, one of the leaders of our profession, is United States Food Administrator, and with him are Requa, Merrill and Edgar Rickard. Several of our distinguished consulting engineers are now consulting engineers to departments of the United States Government. Westervelt is chairman of the War Minerals Committee.

Now it has befallen to another well-known and accomplished mining engineer, Benedict Crowell, who had previously been major in the Ordnance Corps, to be appointed Assistant Secretary of War. Mr. Crowell is a man of interesting personality and distinguished professional attainments. In his new post he will be able to do a lot of good work for which he is well fitted and will reflect credit upon his profession while rendering service to his country.

Useless State Reports

SOME states have established departments of mine inspection or geology, which as a part of their duties issue reports of mineral production that, technically, are "not worth the paper they are printed on." Statistics giving terms of value instead of quantity may be superficially interesting, but they are devoid of usefulness to the mining industry, terms of value being variable in normal times and meaningless under conditions of extraordinary variation such as have prevailed during the last three years. Straining for a "showing" by comparing present war-time prices with 1913 values is not worth while. With such wide fluctuations as now prevail, no useful comparisons can be made respecting the real progress of the industry unless comparative quantities are known. Mere value reports are of no use to

the mineral industry which should be served by the state departments issuing them. Even when these reports are intended for the daily press, the state bureaus should take the lead in giving to newspapers something useful to disseminate. Furthermore, these "value" reports will be extremely confusing a few years hence, and in these times of imperative conservation are an indefensible waste of white paper and labor.

Anaconda as a Manufacturer

THE Anaconda Copper Mining Co., which is now building a copper-rod and wire mill at Great Falls, Mont., expects to have the plant in operation before the middle of 1918. This will not be Anaconda's maiden effort in a commercial manufacturing business, for during many years it has been a manufacturer of mining machinery and of firebrick, both clay and silica. In each of those lines it has been, and is, one of the largest manufacturers west of the Mississippi River.

Going into the copper-rod and wire business is simply an extension of Anaconda's manufacturing activities. Nothing could be more natural than this, for it produces refined copper at Great Falls; and in Montana, and indeed the entire Northwest, which is becoming an electrified empire, it has a fine market for the products. It would look rather foolish to freight Great Falls wire bars to the East in order to draw them into wire that would subsequently be freighted back to electrify the St. Paul railway, through Montana and Idaho, or to supply the Montana Power Co.

We may confidently expect that Anaconda's next step in the manufacturing business will be to erect a brass factory. Producing refined copper and refined zinc at Great Falls, the logical thing will be to combine them to make as much brass as the Western territory requires. Montana is an empire in which the Anaconda Copper Mining Co. supplies the major part of the raw material, including metals, coal and lumber. The creation of a manufacturing industry on such a basis is a logical development.

The 27th Engineers

THE War Department is finding that it has been making the same mistake that was made in Great Britain and France. Probably it is duplicating a good many of their mistakes, but we now have reference to one in particular. In the first place, men were drafted indiscriminately for the line regiments of the Army. Later it was found necessary to organize regiments for special purposes, such as gas and flame work, tunneling and mining work, etc., by which time it appeared that the men who ought to be in those special regiments were scattered indiscriminately and were not easy to collect.

In the United States the first draft took men in the same proportion from every part of the country. The quotas drawn from Lake Superior, the Minnesota iron ranges, Butte, Bisbee, etc., consisted largely of miners. For example, about 2000 men were taken from Butte, a large proportion of whom were miners, which is one of the reasons for the scarcity of miners in Butte at present.

Now Major Perry and Captain Landers, two of our well-known mining engineers, are organizing the 27th Engineers, U. S. N. A., which is to be especially a mining regiment, and are asking for volunteers to it. We hope that they will get all that they need and that mine managers will coöperate in the recruiting of this regiment, for the number of men that it will require is not very large and the working force of the mining industry will not thereby be diminished seriously. If miners who have already been drafted and are now scattered among the several cantonments could be released for reassembly in the mining regiment, that would be desirable. But that would be a difficult thing to do. Nevertheless the War Department ought to try to do something of the sort and ought to give its attention to the avoidance hereafter of using special material for the purposes for which ordinary material is sufficient.

However, the withdrawal of miners already drafted is manifestly something that is impracticable immediately, and the pressing matter is to recruit the 27th Engineers as rapidly as possible. We hope that mine managers will coöperate in this, especially in those districts—like the lead and zinc mining districts—where there is now a surplus of labor and miners can be spared. But everywhere it may as well be frankly recognized that a second quota of the draft will soon be called to the colors, and there will be no occupational exemption except probably in the case of shipwrights. It would be an excellent thing therefore for miners who hold numbers indicating the probability of their being called in the next draft to volunteer now for the 27th Engineers, which would take them into a regiment of congenial character and would enable them to preserve previous associations.

British Mineral Statistics

THE British mineral statistics for 1916, lately published, are interesting as an index of what may happen to our own mineral industry, the United States having entered the war under conditions similar to those of Great Britain, that is, both were essentially non-military nations, and both were obliged to withdraw from peaceful pursuits a large percentage of the working population. Unfortunately, the mineral industry of Great Britain is far less diverse than that of the United States, and in the production of metalliferous minerals is relatively unimportant, except for iron ore.

The noteworthy feature of the British statistics is their exhibition of how the production of the essentials has been fairly well maintained, while the non-essentials have fallen off to a much larger extent. Thus, comparing the figures for 1913 with those of 1916, we find that in the former year there was a production of 287,430,473 tons of coal, 15,997,328 tons of iron ore, and 3,280,143 tons of oil shale. In 1916 coal production had declined to 256,375,366 tons, iron ore to 13,494,658 tons, and oil shale to 3,009,232 tons. Turning now to non-essentials, if we may be permitted thus to characterize the rocks, we find that gravel and sand declined from 2,409,152 tons to 1,961,650 tons. Igneous rock declined from 7,098,493 tons to 4,843,176 tons. Limestone declined from 12,740,664 tons to 10,541,573 tons. Sandstone declined from 3,977,303 tons to 1,999,308 tons. If our interpretation be correct, the decline in the production of sand and rock reflects curtailment in domestic building operations, things not immediately necessary having manifestly been postponed. On the other hand,

attention has been concentrated on the production of coal and iron, which are indispensable, and their output has been pretty well maintained. The British statistics may be considered to reflect good organization.

According to late advices from Washington in regard to the Explosives Act, which became effective Nov. 15, the U. S. Bureau of Mines has ruled that explosives may be used by a company, situated at a point where no licensing agent has yet been appointed, immediately after it has filed with the Bureau of Mines an application for a license by mail or telegraph. The purpose underlying this ruling is to prevent any possible loss of production.

BY THE WAY

We have just received the circular of the Stockholders Mining Co. This sounds too good to be true.

This one is revived by *Everybody's:* An Italian, having applied for citizenship papers, was being examined in the naturalization court. Q—"Who is the President of the United States?" A—"Mr. Wils." Q—"Who is the Vice President?" A—"Mr. Marsh." Q—"Could you be President of the United States?" A—"No." Q—"Why?" A—"Mister, you 'scusa me please; I vera busy worka da mine."

As the traveler waited for an outgoing *fotinga* he heard the *administrador* of the Busy mine address a group of subordinates. "Boys, there's some monkey business going on. I can't see why these niggers want to carry off copper ore, but it is disappearing in bunches. Keep a sharp lookout." The next night the traveler put up at the neighboring Hope mine. Just at dusk there was a slight commotion down hill from headquarters and soon a half-breed foreman reported, "Juan, he come back with some copper rocks and want his money." Up jumped the new super, shouting: "Tell that crazy fool to beat it. The idea of his thinking we would buy ore." A few days later in the capital the traveler met an old acquaintance. After an exchange of refreshment courtesies the O. A. grew confidential. "Say, Bill," he said, nudging his chair up close, "there'll be things doing in Hope stock pretty soon. Last time I went north I made old O. N. Bale dig me up 500 shares as a bonus on the option deal. This is where I cash in on the top price." As the traveler puffed his Corona that night he reviewed the experiences of the past few days, and although naturally unsuspicious, he could not refrain from murmuring, "I wonder, now, if the Hope mine is going to make a little shipment."

It was a proud boast, often heard in America in the years that are gone, that what one man could do could be done by another. A Yankee could turn his hand at anything. Happily, says *Power*, we have emancipated ourselves from this notion, always false but never so clearly recognized as false as in these days, when it is the ideal that every turn of the hand shall conform to the dictates of science. Modern efficiency has little liking for Jack-of-all-trades. If current reports be true, one of the disruptive forces in the new-blown democracy of Russia is just this lack of appreciation of specialization and of the organization necessary to coördinate it into industrial production. One of these reports is to the effect that the miners and other workmen at a certain property called on the engineers, demanding that since Russia was a free country and all its citizens on a footing of equality, the engineers must take their turn in the mines and work as the others did. Then followed this colloquy: The Engineers: "And who will do our work?" The Workmen: "Some of us will take turns in your offices." The Engineers: "But what will you do there?" The Workmen: "The same as you do—sit around, sharpen pencils and smoke cigarettes."

Geology Fellers

Used to think I nawed all about minin'
  For, damme, was born at the trade.
I learned 'ow to 'andle a muck stick
  An' nawed 'ow to put up a raise.
In h'early days over in Redrouth
  Wen fayther was shif'boss, I nawed
The 'ol bloody mine like a pictur'
  An many's the set that I've sawed.

In sinkin' a winze, or block 'olin'
  Or in cavin' a stope on the sub,
There was nothin' that I could be beat at,
  An' I 'eld up my h'own at the pub.
I could 'andle a 'ammer at single
  Or double, if needs that there be.
An throughh'out the 'ol bloody country
  There was no better miners than we.

I nawed 'ow to 'andle my powder
  An' just 'ow to crimp on a cap,
An' all other things about blastin',
  An' just 'ow a vug we should tap.
An' put'n' up timber for square sets
  Was simple as simple could be,
For h'it's all a day's work for a miner
  Jus' the same as 'is pasty an' tea.

All we 'ad was a compass an' tapeline
  That we used for to 'ole thro' a drif,
An, damme, at that we come closer
  Than some I 'ave seen with the gif
For figgerin' an' for surveyin'—
  But mind I ain't sayin' as 'ow
There ain't lots 'oo've 'ad edication
  'oo can do jus' as well, I'll allow.

But now, I 'as come to conclusion
  That, damme, I don't naw so much—
H'understand that h'it's not about minin',
  But of strikes, an' the fault planes, an' such.
We mined h'out the h'ore as we foun' h'it,
  Not stoppin' to figger h'out 'ow
We could catch 'er again if we lost 'er,
  Like the fellers—'oo naws—does h'it now.

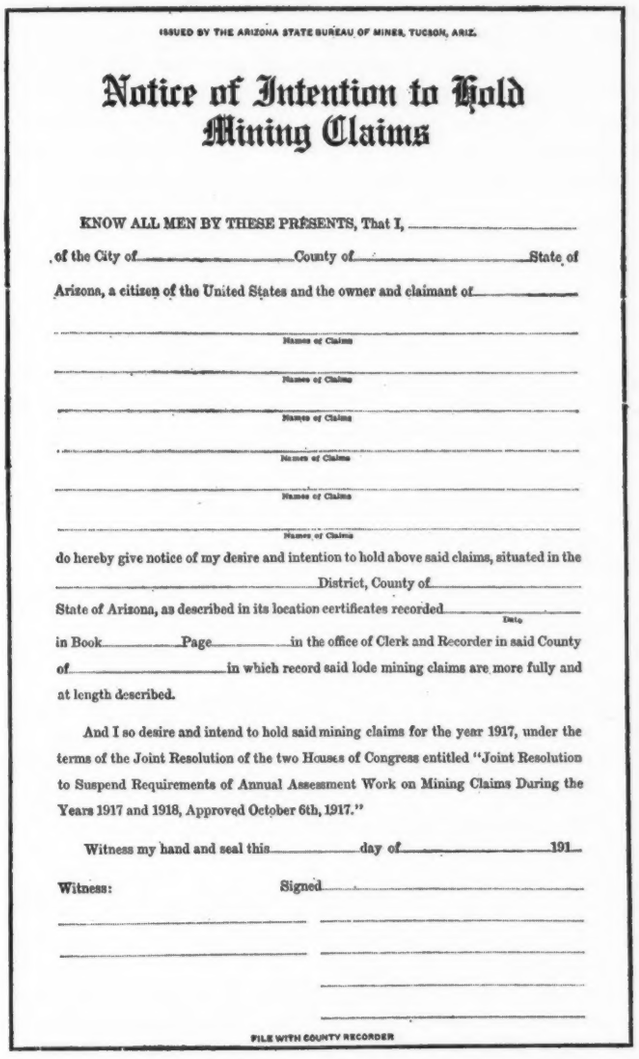
Dos thee naw these geology fellers?
  Why, damme, just listen to me.
They can tell thee more things about minin'
  An 'ow the worl' 'appened to be,
Than thee ever did'st read of in Scriptur'.
  An', damme, I naw that h'it's true,
For 'av'ent I seen 'em find pay dirt
  W'en we thought that the minin' was thro'?

I 'as. An' I'll say this much further—
  Tho' I'm an ol' 'and at the game,
An' I naws that on one h'end of minin'
  I can 'andle whatever you name—
That wen h'it comes down to the sayin'
  Of just where your h'ore must be to,
Just call in geology fellers,
  An' they'll bloody soon tell you 'oos 'oo.

D. E. CHARLTON.

Release from Assessment Work

Every holder of a mining claim desiring release from assessment work under the provisions of the Assessment Bill, signed on Oct. 5 by President Wilson, must "file or cause to be filed in the office where the location notice or certificate is recorded on or before Dec. 31, of each of the years 1917 and 1918, a notice of his desire to hold said mining claim under this resolution." The full text of the law is as follows:



ISSUED BY THE ARIZONA STATE BUREAU OF MINES, TUCSON, ARIZ.

Notice of Intention to Hold Mining Claims

KNOW ALL MEN BY THESE PRESENTS, That I, _____

of the City of _____ County of _____ State of

Arizona, a citizen of the United States and the owner and claimant of _____

_____ Names of Claims

_____ Names of Claims

_____ Names of Claims

_____ Names of Claims

_____ Names of Claims

_____ Names of Claims

do hereby give notice of my desire and intention to hold above said claims, situated in the _____ District, County of _____

State of Arizona, as described in its location certificates recorded _____ Date

in Book _____ Page _____ in the office of Clerk and Recorder in said County of _____ in which record said lode mining claims are more fully and at length described.

And I so desire and intend to hold said mining claims for the year 1917, under the terms of the Joint Resolution of the two Houses of Congress entitled "Joint Resolution to Suspend Requirements of Annual Assessment Work on Mining Claims During the Years 1917 and 1918, Approved October 6th, 1917."

Witness my hand and seal this _____ day of _____ 191_

Witness: Signed _____

_____ _____

_____ _____

_____

_____

FILE WITH COUNTY RECORDER

FORM SHOWING CORRECT WAY OF FILING NOTICE OF INTENTION TO HOLD CLAIM

PUBLIC RESOLUTION No. 12, 65TH CONGRESS

Joint resolutions to suspend the requirements of annual assessment work on mining claims during the years 1917 and 1918.

Resolved by the Senate and House of Representatives of the United States of America, in Congress assembled, that in order that labor may be most effectively used in raising and producing those things needed in the prosecution of the present war with Germany, that the provision of Section 2324 of the Revised Statutes of the United States which require on each mining claim located, and until a patent has been issued therefor, not less than $100 worth of labor to be performed or improvements to be made during each year, be and the same is hereby suspended during the years 1917 and 1918: Provided, that every claimant of any such mining claim in order to obtain the benefits of this resolution shall file, or cause to be filed, in the office where the location notice or certificate is recorded, on or before Dec. 31, of each of the years 1917 and 1918, a notice of his desire to hold said mining claim under this resolution: Provided further, that this resolution shall not apply to oil placer locations or claims.

This resolution shall not be deemed to amend or repeal the public resolution entitled "Joint resolution to relieve the owners of mining claims who have been mustered into the military or naval service of the United States as officers or enlisted men from performing assessment work during the term of such service," approved July 17, 1917.

Approved Oct. 5, 1917.

It is important that claimholders should take notice that they must record their intention to hold, precisely the same as though they were recording their assessment work. For the benefit of Arizona claimholders, the Arizona State Bureau of Mines has issued a blank form especially for this purpose, which may be obtained by writing directly to the Bureau. A reproduction is given in an accompanying illustration.

The use of this blank form is not mandatory but it will obviate the numerous mistakes and consequent delays that are inevitable if claimholders attempt to signify their desire to hold their claims without knowing exactly how to proceed. Such notice should be sent to the county recorder of the county in which the claims are situated.

Manufacture of Ferrochromium*

The work of Faraday, Stodarts and Berthier gave to the arts ferrochrome, or ferrochromium, of which more is now made in the electric furnace than any other ferroalloy except ferrosilicon. Berthier found that the addition of ferrochromium with 17% chromium to steel, so as to give 1½% chromium in the steel, gave a better quality product. Ferrochrome was produced commercially in Germany in 1873, and in England and France in 1877. Until the introduction of the electric furnace in 1899, ferrochrome was made entirely either in crucibles or the blast furnace. The crucible was used only for making the higher grades, and in this the chromite was reduced with charcoal, and a flux of lime, borax, fluorspar or water glass. Reduction of chromite in the blast furnace is somewhat difficult and requires considerable fuel. Little ferrochrome is made now by crucible or blast furnace, as the electric furnace is cheaper, especially where water power is obtainable. A small amount of carbon-free ferrochrome is made by the thermit process.

For making ferrochromium, foreign manufacturers use only chromite containing less than 1% of phosphorus and sulphur and about 50% Cr_2O_3, while high-grade anthracite is generally employed as a reducing agent. American manufacturers make use of a lime slag, and may employ coke or charcoal as the reducing agent instead of anthracite. Some also use Cuban ore, which contains considerable phosphorus and sulphur. Several types of electric furnace may be used, but all are constructed on the principle of the Sieman's crucible with a conducting hearth, or are similar to the Héroult steel furnace with vertical electrodes in series.

The charge, consisting of powdered chromite and, say, anthracite, is piled into the open top of the furnace, around the electrodes, while the molten charge is tapped into pots, where the slag and metal separate. Ferrochrome containing as low as 5% carbon can be made

*Excerpt from an article, "Chromium—Its Ores and Uses," by Heinrich Ries, in "Mineral Foote-Notes," of Foote Mineral Co.

economically, while the slags run 0.5-1% Cr_2O_3. High-carbon ferrochrome is refined in an arc furnace, the alloy being subjected to long heating with a slag of chromite, lime and fluorspar, the proportions being adjusted to the amount of carbon and silica to be removed, and the silica that must be fluxed in the chromite used. This slag covers the ferrochrome, and the time of heating depends on the carbon in the alloy. The resulting slag contains about 25% Cr_2O_3, and is used over again, thereby avoiding loss of chromium. With this process the carbon can be reduced from 10 to 0.25%, but 0.5% is usually low enough.

Ferrochromium is extensively used in the manufacture of steel for armor plates, armor-piercing projectiles, automobiles, high-speed tool steel, etc. The alloy as such is not used directly, but is added to the steel, giving an alloy steel. Simple chromium steel was one of the first alloy steels to be made, and has been much used in safes, but it is of more importance now when associated with other metals, as nickel or vanadium. Indeed, there is sharp competition now between chrome-nickel steel and chrome-vanadium steel, the two alloys exerting similar beneficial effects on the hardness and toughness of the steel. The distinguishing feature of chrome steels is their great hardness. They usually contain 1-2% Cr and 0.8-2% C. Armor plate has about 3.25% Ni, 1.5% Cr, and 0.25% C. The quantity of carbon in ferrochromes for several different purposes is about as follows: For tool steels and high-speed steels, less than 2%; for general open hearth casting, 4-6%; for armor plate and projectiles, 8-9 per cent.

Metal Exports Under Licensing System in September, 1917

WASHINGTON CORRESPONDENCE

Unusual interest attaches to exports in September, 1917, because this was the first entire month following the inauguration of the licensing system for which it was possible to compile export statistics. In many cases no exportations whatever were made to European neutrals, and exports of metals to Latin America and to Japan showed a marked decrease. On the other hand, there were important increases in the quantities shipped to countries associated with the United States in the war.

In September, 2,017,838 lb. of unrefined copper was exported. This is a marked increase over September, 1916, when only 457,308 lb. was sent abroad. The amount of refined copper exported decreased notably. It was 60,601,803 lb., as compared with 65,265,153 lb. in September, 1916. In the months for which comparisons are presented, the copper exports to France increased from 23,854,325 to 37,584,619 lb. Exports to the United Kingdom showed a decrease from 14,873,682 lb. in September, 1916, to 7,221,518 lb. in September, 1917, and those to Italy decreased from 13,492,878 to 9,871,457 pounds.

The cutting off of practically all exports of lead to neutrals and the sharp decline in the amount sent to Russia are mainly responsible for much lower figures for this metal in September, 1917, than in September, 1916. In September, 1916, 32,710,557 lb. of lead was exported, whereas the total for September of this year was 8,899,719 lb. The exports to Russia in September, 1916, were 20,065,462 lb. against a total of 4,537,567 lb. in the same month of 1917. Another feature of lead exports was the fact that not a single pound was cleared for Japan, whereas that country took 1,632,000 lb. in September of 1916.

Despite the fact that there were heavy decreases in exports of spelter to neutrals and to Russia, the total exports of this metal increased decidedly in September, 1917, over the amount exported in the same month, 1916. The figure in September of this year was 52,868,729 lb., as compared with 37,737,249 lb. in September, 1916. The principal increases were in the shipments to the United Kingdom, France and Italy. Exports to the United Kingdom in September this year were 24,725,657 lb. as compared with 15,359,454 lb. in September, 1916. Exports to France in September of this year were 16,467,576 lb. as compared with 11,351,944 lb. in the same month of 1916. The exports of spelter to Italy increased from 2,812,202 lb. in September, 1916, to 7,137,059 lb. in September, 1917. Total exports of spelter for the first nine months of the current year were 327,690,984 lb. During the corresponding nine months of 1916, they were 259,483,661 pounds.

There was no important change in the amount of sulphuric acid exported. During September, 1917, the total was 1,257,985 lb., against 1,236,702 lb. in September, 1916. Sulphur exports fell from 19,424 tons to 10,052 tons. It is interesting to note in the September customs report that the United States is becoming a regular exporter of superphosphates. Regular shipments have been made for several months. In September, 1917, 4093 tons was exported.

While imports of manganese ore decreased from 73,536 tons in September, 1916, to 36,755 tons in September, 1917, the total imports for the first nine months of the current year are nevertheless greater than those for the corresponding portion of 1916. During the 1917 period, 494,633 tons of manganese ore was imported, against 469,222 tons in the same months of 1916. The imports from Brazil decreased from 55,360 tons in September of 1916 to 26,472 tons in September of this year.

Pyrites importations during the first nine months of 1917 were 691,560 tons, against 1,011,702 tons during the same months of 1916, a decided decrease. During September, 1916, and September, 1917, imports were 95,333 tons and 80,844 tons respectively. Due largely to increased amounts received from Mexico, lead imports during September, 1917, reached a total of 11,417,875 lb., as compared with 4,639,312 lb. in September, 1916. Chile, which in September, 1916, sent 1,289,920 lb. of lead to the United States, exported none at all to this country in September, 1917.

Zinc imports for the first nine months of the current year were 128,054,141 lb., which is a decided decrease from the record of the corresponding months of 1916, when 243,541,390 lb. was imported. During September of this year they were 7,888,290 lb., and in the same month of last year 9,919,070 pounds.

International Ore Co., of Saltillo, Coahuila, Mex., is constructing a zinc smeltery, comprising 600 retorts, according to the Boletin Financiero y Minero de Mexico of Oct. 10. The furnaces will burn crude petroleum.

NEW PUBLICATIONS

A Report on the Bauxite and Fullers Earth of the Coastal Plain of Georgia. By H. K. Shearer. Pp. 340; illus. Bull. 31, Geological Survey of Georgia, Atlanta.

Report of Proceedings of the American Mining Congress, Chicago, Ill., Nov. 13-16, 1916. Pp. 642; illustrated. American Mining Congress, Washington, D. C.

Contains, besides business reports, etc., a large collection of technical and semi-technical papers.

Advanced First-Aid Instructions for Miners, a Report on Standardization. By G. H. Halberstadt, A. F. Knoefel, W. A. Lynott, W. S. Rountree and M. J. Shields. 4½ x 5¾, pp. 154; illus. U. S. Bureau of Mines, Washington.

A useful book in simple language, the nature of which is well described by the title.

Mining Rights on the Public Domain: Lode and Placer Claims, Tunnels, Mill Sites and Water Rights, Statutes and Decisions, Forms and Procedure on Patent Applications. By R. S. Morrison and Emilio D. De Soto. 15th Edition. 5 x 8, pp. 771. Bender-Moss Co., San Francisco.

This is a new edition of a standard book of which the usefulness has been thoroughly proved.

A Microscopic Study of the Silver Ores and Their Associated Minerals. A dissertation submitted to the Department of Geology and Mining and to the Committee on Graduate Study of the Leland Stanford Junior University in Partial Fulfilment of the Requirements for the Degree of Doctor of Philosophy. By F. N. Guild. Pp. 57, illus. Reprinted from Economic Geology, Vol. XII, No. 4, June, 1917. Economic Geology Publishing Co., Lancaster, Penn.

The American Fertilizer Handbook, the Standard Reference Book and Directory of the Commercial Fertilizer Industry and Allied Trades. 7½ x 10½, pp. 436; illus. $1. Ware Bros. Co., Philadelphia, Penn.

Contains special articles and statistics of interest to the fertilizer trade on such subjects as potash, phosphates, pyrites, sulphur, etc.; directory of fertilizer manufacturers of the United States; classified directory of the allied fertilizer trades.

Compressed Air Practice in Mining. By David Penman. 5 x 7½, pp. 221; illus. Charles Griffin & Co., Ltd., London; J. B. Lippincott Co., Philadelphia.

A complete treatise on the subject, aimed to give a thorough understanding of the principles underlying the generation and use of compressed air in mining. Should be of value to the student as well as to those engaged in practical mining.

Sandstone Quarrying in the United States. By Oliver Bowles. Pp. 143; illustrated. Bulletin 124, U. S. Bureau of Mines, Washington.

An exhaustive treatise on grades of sandstones in the United States, their uses, methods of quarrying and the machinery used in quarrying, conveying and finishing for the market. Contains tables of distribution, value, etc. Number of men employed in industry, accidents and fatalities and their principal causes.

Military Preparedness and the Engineer; a Handbook for the Civilian Engineer. Second edition. By Ernest F. Robinson. 4 x 6½, pp. 361; illus. $2. Clark Book Co., New York, N. Y.

Another case of "second edition revised and enlarged" to which much material has been added describing engineering on the European battlefields with particular reference to wire entanglements and consolidation of mine craters. An interesting book either for civilian engineers or anyone contemplating service with the colors.

American Society for Testing Materials. I, Membership List, List of Standards, etc.; 6 x 9; pp. 252. II, Standards Adopted in 1917; 6 x 9; pp. 44. Edited by the Secretary-Treasurer and published by the society, Philadelphia, 1917.

No. I is the regular annual report of the society, containing lists of members and officers, bylaws and a condensed statement of the various standards which have been adopted up to date. This gives data by which the full account of any standard test can be obtained. No. II contains a full account of four standards proposed at the annual meeting of this year and since approved by letter-ballot of the members. All the new standards relate to the testing of paints and varnishes. The society continues to grow, and on Aug. 1, 1917, had 2193 members. The International Association for Testing Materials, with which it is affiliated, has been prevented by the war from holding any meetings since 1913, and its activities are practically suspended.

Report on Mining Operations in the Province of Quebec, 1916. Theo. C. Denis, Superintendent of Mines. 7 x 9½, pp. 172, with maps and illustrations. Department of Colonization, Mines and Fisheries, Quebec, 1917.

The total value of the mineral products of the Province of Quebec in 1916 was $13,287,024 and 8063 men were employed. As compared with the previous year, there was a substantial increase in mine production, but a decrease in clay products and building materials, due mainly to the disorganization resulting from the war. The report is an unusually careful and complete statement of conditions in the various branches of the mining industry, of which asbestos, copper, magnesite and chrome ore are the more important. It is illustrated by a number of reproductions of photographs. Appended to the report is an interesting paper by J. A. Bancroft, of the Canadian Survey, on the geology and mineral resources of the district along the National Transcontinental Railway from Harvey Junction to Doncet and the Canadian Northern from St. Thecle to Rivière-à-Pierre.

Report of the Committee on Petroleum, California State Council of Defense. Max Thelen, Eliot Blackwelder and D. M. Folsom, Committee. 6 x 9, pp. 192, with maps and diagrams. California State Printing Office, Sacramento, 1917.

This excellent report contains a great mass of information about the California petroleum fields—their history, location and conditions. After a chapter devoted to the general subject of petroleum, it goes into a description of the various oil districts of the state, their situation, extent and statistics. Transportation facilities are fully described and mapped out. There are chapters on the uses of California oil, its refining and adaptation to use as fuel, and its marked effect on the manufacturing and fuel situation on the Pacific Coast. The concluding chapters relate to probable future production and the best methods of conserving and increasing the supply. The committee is evidently of the opinion that too much of the California oil is used as fuel and considers in its report how and with what substitutes some of it can be replaced without curtailing industry. The report is illustrated with a number of maps, diagrams and sketches which add much to its clearness and value.

Summary Report of the Geological Survey, Department of Mines for the Year 1916. Pp. 419, illus. Canadian Department of Mines, Ottawa.

The 1916 report is of particular interest because of the search for new minerals demanded by war requirements and the incidental stimulus given to other mining explorations. Molybdenite deposits near Quyon, Que., are reported on by Charles Camsell, and those of the Lillooet district in British Columbia by C. W. Drysdale. The tungsten deposit at Burnt Hill, New Brunswick, and the scheelite mine in Halifax County, Nova Scotia, were also reported on by Mr. Camsell. D. D. Cairnes reported wolframite in the gold placers of Canadian Creek, Yukon Territory, in the Klotassin area. Magnesite deposits of the Grenville district, Quebec, were investigated by M. E. Wilson; A. O. Hayes described the deposit at Orangedale, Nova Scotia, and the Bridge River magnesite deposits in British Columbia are reviewed. It is impracticable to give a complete list of the mineral deposits covered in the present volume, but on account of the special interest in the Manitoba region it is worth while to mention that E. L. Bruce has reported on the copper areas at Flinflon and Schist Lakes; also that J. A. Dresser has described the country east of Lake Winnipeg, including the gold areas of Rice Lake and Gold Lake.

Personals

J. B. Tyrrell, of Toronto, Canada, sailed from New York on Nov. 14 for England.

J. D. Hubbard is now general superintendent for the Holden Mining and Milling Co. at Tuscarora, Nevada.

Edward Ervin has been appointed superintendent of the Gold Pan mine in the Rice Lake district of Manitoba.

W. G. Anderson has resigned the management of the Ore Chimney Mining Co., Ltd., at Northbrook, Ont., Canada.

D. B. Dowling, of the Canadian Geological Survey, is at Peace River, making an examination of the well of the Peace River Oil Company.

L. D. Cooper, chief engineer of E. J. Longyear Co. of Minneapolis, Minn., passed through New York recently en route to the Birmingham, Ala., district.

Charles Chynoweth, of Houghton, Mich., secretary of the Wolverine & Arizona Mining Co., has gone to Bisbee, Ariz., to attend the fourteenth annual meeting of the company.

W. C. Webster, secretary, general manager and director of the Nichols Copper Co., 25 Broad St., New York, has resigned. Mr. Webster expects to take a rest before assuming further duties.

H. S. Buck, manager of the Fort Smith Spelter Co., Fort Smith, Ark., will become general manager of the plant soon to be established at Greencastle, Ind., by the newly organized American Zinc Products Company.

Lee L. Wilcox, chief engineer for the Republic Iron and Steel Co., has just completed some work at the company's Hartford group mines, at Negaunee, Mich., and returned to his headquarters at Gilbert, Minnesota.

L. E. Dunham, who has been connected with the iron-ore department of M. A. Hanna & Co., Cleveland, for a number of years, has been appointed director of purchases for the various interests of which the firm is agent.

D. A. Angus of the Right-of-Way mine, Cobalt, Ont., has been appointed manager of the Tough Oakes mine at Kirkland Lake, Ont., in place of **Charles O'Connell,** who becomes manager of the Boston Hollinger mine, Boston Creek.

George R. Jackson, superintendent of the Maas and Negaunee mines of the Cleveland-Cliffs Iron Co., and master mechanic **O. D. McClure** are at White Sulphur Springs, Va., on business for the company.

John G. Worth, a well-known mining engineer, is a captain in the U. S. Army and is commanding officer of the Auxiliary Remount Depot at Macon, Ga. Captain Worth is getting ready to begin shipping the 10,000 animals that are to come to his station immediately.

Horace B. Patton, for 24 years professor of geology and mineralogy at the Colorado School of Mines, has opened an office at 817 Fifteenth St., Golden, Colo., as consulting and field geologist. He will give special attention to oil and gas and metalliferous deposits.

Benedict Crowell, a well-known mining engineer, has been appointed Assistant Secretary of War to succeed William M. Ingraham. Mr. Crowell is an engineer by profession and has been in Washington for some time in an advisory capacity to the General Munitions Board. Some months ago he was commissioned a major in the Engineer Corps and placed in charge of the Washington office of the Panama Canal. He will resign his commission to accept the new appointment.

Elmer LeC. Goldsmith, John W. Lewis, Edward J. Francis, Elmo N. Murphy, Carl R. French, William D. Lewis, and Charles B. Moore, all second lieutenants in the Engineer Officers' Reserve Corps, have been relieved from duty at the engineer training camp, Fort Leavenworth, Kan., and ordered to report by letter to the Director, U. S. Geological Survey, for assignment to duty connected with military mapping. Charles M. Madden, Edward H. Stelle, Frederic E. Smith, Edward P. Asbury, George B. Davidson, Frederick W. Look, Gordon D. Cooke, Joseph W. Geary, Jr., and Walter K. Wood, all second lieutenants in the Engineer Officers' Reserve Corps, have been relieved from duty at the engineer training camp at American University, D. C., and with Sec. Lieut. Herman J. Switzer, E. O. R. C., have likewise been ordered to report by letter to the director, U. S. Geological Survey, for assignment to duty connected with military mapping.

Obituary

Lieut. A. T. Skill was killed in action in France on Oct. 26. He was 35 years of age and previous to his enlistment was mining recorder at Elk Lake, in northern Ontario.

Marks Lissberger, a pioneer in the white metal business of the United States, died after a long illness on Nov. 9. He was born in Germany and came to New York in 1844. He founded the firm of Marks Lissberger & Son.

Schuyler Livingston Parsons died suddenly in New York, Nov. 4. He was born and brought up in New York and had been for many years engaged in the trade in sulphur, nitrates and other heavy chemicals. He was head of the well known firm of Parsons & Petit, dealers and importers, and agents in the United States for the Italian Consorzio Obbligato, which controls the production and exports of Sicilian sulphur.

Lieut. Col. Thomas C. Irving, of Toronto, Ont., commander of the 4th Divisional Engineers overseas, was recently killed in France. He was an engineer by profession and a graduate of McGill University. He was formerly associated with F. H. Clergue in the development of the group of industries at Sault Ste. Marie, now owned by the Lake Superior Corporation, and was specially identified with the Helen iron mine and the construction of the Algoma Central Ry. Latterly he was vice president of Robert W. Hunt & Co., Ltd., inspecting engineers of Toronto. He was made a lieutenant-colonel in the fall of 1916 and received the Distinguished Service Order. He was 38 years of age.

Societies

New York Section of the Mining and Metallurgical Society of America will hold its next meeting on the evening of Nov. 22 at the Columbia Club. The guests of the evening will be Major O. B. Perry and Major Rousseau. Major Perry will talk on the subject of "Trench Methods."

Engineers' Club and **New York Electrical Society** will hold a joint meeting at the Engineering Societies' Building, 29 West 39th St., New York, on Nov. 15, at 8 p.m. Lieut.-Col. Ivor Thord-Gray, late commanding 11th Northumberland Fusiliers, B. E. F., will give a short informal talk on "Some Phases of Trench Warfare," illustrated by British and French official pictures. An address will also be given by Capt. P. Corcoran, late commanding 37th Divisional Signal Co., B. E. F., on "Electrical Communication in Modern Warfare."

United Engineering Society entertained the members of the British Labor Commission now in this country at a dinner given on Nov. 13 in New York at Delmonico's. The commissioners present were Sir Stephenson Kent, director-general of the labor-supply department; G. H. Garrod, deputy assistant secretary of the labor-regulation department; G. H. Baillie, chief technical dilution officer of labor-supply department; and Capt. Cyril Asquith, director of artificer's allocation of labor-supply department. Col. C. C. Carty acted as toastmaster. In their addresses, the commissioners described the British munitions-workers volunteer system, explaining in particular the regulations forbidding the enticement of labor away from one employer by another. Contrary to the prevalent impression in this country, industrial conscription does not exist in England though the Defence-of-the-Realm Act and the authority of the Ministry of Munitions give almost equivalent power in case the voluntary system becomes unsatisfactory. The extraordinary part that women have taken in industry since the war and their aptitude in the lighter work of the engineering plants was interestingly reviewed by Mr. Baillie.

Industrial News

Wellman-Seaver-Morgan Co., Cleveland, Ohio, has established an office at Seattle, Wash., which has been put in charge of Glenville A. Collins. Mr. Collins' office is at 1317-18 L. C. Smith Building.

A. Leschen & Sons Wire Rope Co., St. Louis, Mo., has opened a new office and headquarters building adjoining its plant at St. Louis at a cost of $140,000. Included in the three-story fire-proof structure are provisions for the general offices, also dining, rest and shower rooms for employees, while, adjoining the building, arrangements have been made for a tennis court and golf course.

Davis-Bournonville Co., with general offices and factory at Jersey City, N. J., has taken over the entire plant of the Davis Acetylene Co., at Elkhart, Ind. The latter company has been dissolved and the manufacture of acetylene-lighting generators and accessories discontinued. The plant will hereafter be operated under management from Jersey City for the manufacture of acetylene pressure generators for the oxy-acetylene process, and for special products. The Canadian factory at Niagara Falls, Ont., which has been jointly occupied by the two companies, has also been taken over, and will be operated exclusively for making oxy-acetylene apparatus for the Canadian trade. The Davis-Bournonville Co. has also made additions to its Jersey City plant. It has recently opened a Government sales office in the Colorado Bldg., Washington, D. C., with Henry R. Swartley, Jr., resident manager.

New Patents

United States patent specifications listed below may be obtained from "The Engineering and Mining Journal" at 25c. each. British patents are supplied at 40c. each.

Chlorination—Apparatus for the Chlorination of Minerals. Ricardo Reyes, Mexico, Mexico. (U. S. No. 1,243,977; Oct. 23, 1917.)

Concentrator. William A. Huelsdonk, Modesto, Calif. (U. S. No. 1,244,611; Oct. 30, 1917.)

Continuous Zinc-Smeltery. Woolsey McA. Johnson, Hartford, Conn. (U. S. No. 1,244,504; Oct. 30, 1917.)

Copper—Process for the Treatment of Copper Ores. George Cutler Westby, Ludwig, Nev., assignor to Western Process Co. (U. S. No. 1,244,810; Oct. 30, 1917.)

Drilling—Pitman for Drilling Machines. William C. Sole, Sullivan, Ind. (U. S. No. 1,245,051; Oct. 30, 1917.)

Drilling Machine. Dane Spehar, Miami, Ariz. (U. S. No. 1,244,385; Oct. 23, 1917.)

Dump Cars—Door Lock for Dump Cars. August Anderson, Chicago, Ill., assignor to American Car and Foundry Co., St. Louis, Mo. (U. S. No. 1,244,684; Oct. 30, 1917.)

Furnace Shield. Walter S. Rockwell, New York, N. Y., assignor to W. S. Rockwell Co., New York, N. Y. (U. S. No. 1,245,030; Oct. 30, 1917.)

Loading Excavator. Thomas F. Moore, Syracuse, N. Y., assignor to Moore Trench Machine Co., Syracuse, N. Y. (U. S. No. 1,245,118; Oct. 30, 1917.)

Mine Car—Interlocked Mine-Car Wheel and Journal Box. Warren V. Johnson, Bloomsburg, Penn., assignor to American Car and Foundry Co., St. Louis, Mo. (U. S. No. 1,244,739; Oct. 30, 1917.)

Mine-Car Assembly. Warren V. Johnson, Bloomsburg, Penn., and Frederick H. Gibbs, Brooklyn, N. Y., assignors to American Car and Foundry Co., St. Louis, Mo. (U. S. No. 1,244,740; Oct. 30, 1917.)

Mine-Car Wheel and Attaching Means Therefor. Frederick H. Gibbs, Brooklyn, N. Y., assignor to American Car and Foundry Co., New York, N. Y. (U. S. No. 1,245,142; Oct. 30, 1917.)

Nitrogen—Process for Forming Nitrogen Compounds Using Manganese and Carbonaceous Material. Leland L. Summers, Chicago, Ill. (U. S. No. 1,242,264; Oct. 9, 1917.)

Ore Treatment—Process for the Treatment of Ores. George Cutler Westby, Ludwig, Nev., assignor to Western Process Co. (U. S. No. 1,244,811; Oct. 30, 1917.)

Pneumatic Tool. Mather W. Sherwood, Franklin, Penn., assignor to Chicago Pneumatic Tool Co., Chicago, Ill. (U. S. No. 1,243,770; Oct. 23, 1917.)

Producing Ammonia. Carl Bosch and Alwin Mittasch, Ludwigshafen-on-the-Rhine, Germany, assignors to Badische Aniline and Soda Fabrik, Ludwigshafen-on-the-Rhine, Germany. (U. S. No. 1,244,580; Oct. 30, 1917.)

Steel-Heating Furnace. William R. Bennett, Elmwood, Conn. (U. S. No. 1,244,578; Oct. 30, 1917.)

Zinc—Recovery of Metals from Ores and the Like. Charles S. Vadner, Butte, Mont. (U. S. No. 1,245,137; Oct. 30, 1917.)

Editorial Correspondence

SAN FRANCISCO—Nov. 10

Soapstone Deposit at Sutter Creek is being developed and a considerable tonnage is ready for extraction. Soapstone is found in shists near Sutter Creek and Jackson, but has never been mined commercially to any extent. It also occurs in 26 other counties in the state, extending from the extreme north to the extreme south. It has been developed in most or these counties, but commercially only in a few and that for local use in the construction of firebacks and furnace linings.

Comstock North-End Mines in the last week of October made good progress in development, repairs and extensions of drifts and produced medium-grade ore in the Union and Ophir. In one crosscut on the 2400-ft. level of the Union, the vein was opened for 31 ft. and yielded 81 tons of ore, assaying $20.83. In another direction, same crosscut was driven 44 ft., yielding 96 tons, assaying $27.28; and another crosscut yielded 100 tons, assaying $26.98 per ton. The Union milled a total of 285 tons in the last week, averaging $22.23 and 146 tons averaging $6.75 per ton. Ophir extracted from 2100-ft. level, 144 tons assaying $16.51 and 5 tons averaging $8.15. Andes saved 30 cars of low-grade ore. Jacket, in South-End or Gold Hill district, saved 76 cars of low-grade ore from surface tunnel. Hardinge mill and concentrating tables operated 40 hours during the week; old cyanide plant in operation; new equipment being completed; seventy tons of mine ore were put in mill bins for the present.

Platinum in Siskiyou County has just been investigated by L. M. Prindle and H. C. Ferguson, U. S. Geological Survey, and C. A. Logan of the State Mining Bureau. In the last three months practically every hydraulic district has been visited. Logan covered the ground from Crescent City, Del Norte County to Yreka, via Weitchpec, Orleans, Somes Bar, Forks of Salmon and then went into the Salmon River country. Prindle and Ferguson have completed a survey of the Klamath River mines from Happy Camp to Hamburg Bar. It has been found that until within the last two years practically no attention has been given the platinum resources in these regions. In many of the hydraulic mines the metal was thrown away because its value was unknown to the miners. But since the conditions brought about by the war have increased the value of the natural alloy of platinum with iridium and osmium, in which the platinum occurs in these regions, and this value is four to five times the value of gold, the miners are waking up to the opportunity. Most of the platinum in the state is of the same character as in Siskiyou and adjoining counties, and much of it might more properly be classed as "platiniridium," which in Trinity River region has been found in nuggets of a few ounces weight. Platinum is a constituent of the black sands of Feather River in Butte County, Yuba River in Yuba County, north fork American River in Placer County, Klamath River and other streams in Siskiyou County, Trinity River in Trinity County, American River in Sacramento County and in the beach sands in Del Norte, Humboldt, San Luis Obispo, Santa Barbara, Santa Cruz, Mendocino and Ventura counties. Also in concentrates from lode mines in the central and eastern parts of the state. The total amount of platinum produced in the state in 1915, reported by the State Mining Bureau, was 667 oz., valued at $21,149. This came from eight counties, as follows: Sacramento, 196 oz.; Butte, 126; Yuba, 132; Trinity, 13; Calaveras, Merced, Plumas and Stanislaus, combined, 200 oz. The total in 1914, as reported by the Geological Survey, was 463 oz., valued at approximately $32 per oz., or about the same as in 1915.

BUTTE—Nov. 10

Strike Bulletins, containing statements attacking the mining companies, and calculated to curtail the production of copper, have caused the indictment on four counts of disloyalty to the United States Government, of George Tompkins, a member of the Metal Mine Workers' Union. He was arraigned Nov. 3 before Judge Bourquin. The indictment charges him with conveying false reports and false statements to defeat the success of war operations of the United States and to aid the enemy. The "strike bulletins" were freely circulated among Butte miners and were traced to him. They formed the principal base for indictment. Tompkins was ordered to enter a plea to the indictment within a few days.

Price of Coal, for prepared sizes, has been increased from 10 to 20%, as a result of Federal and state control, which is exactly the opposite effect the public had hoped for. Much dissatisfaction is expressed with the seemingly unwarranted procedure of Federal Fuel Administrator Garfield in authorizing an increase of 65c. a ton for prepared sizes, thus advancing the price to $3.60 from $2.95, the price fixed Aug. 21 on Montana coal; all without consulting either the Governor or other officials of the state and all to the advantage of producers, but to the great detriment of the consumer. When this increase was announced, Governor Stewart wired the Federal Administator, protesting against the authorization of the increase, first, because he was not consulted in the matter and second, because the increase did not seem warranted by the cost of production as known to the state authorities, but unknown to the Federal administration, which did not itself make any investigation in the field. The only satisfaction received so far, in reply to the Governor's protest, is the assurance that in the future prices would not be changed without the consent of the state authorities; that an investigation would be made in the field as soon as possible and that prices might be reduced if such investigation should reveal facts to warrant such action; that the authorized raise was only temporary, pending the results of the promised investigation, and was intended to prevent a shortage of production at a critical period. In the meantime the damage has been done. Operators and representatives of the United Mine Workers' Union have been in session for several days at Great Falls, and have agreed on a material increase in the wage scale of the miners on the strength of the authorized increase of the price of coal to the operators. In the face of previous experiences, the general public does not entertain any hopes that a reduction of wages and prices, following an investigation, would be countenanced by either laborers or operators and has resigned itself to pay the bill. Whether it will do so gracefully should retail prices continue to soar as they have recently, in spite of promises of relief by the legal authorities, remains to be seen.

DENVER—Nov. 10

Colorado School of Mines affairs are again receiving a public airing as the result of an opinion rendered by Attorney General Leslie E. Hubbard, strongly recommending a full hearing of charges made by the Alumni association against Victor C. Alderson, president of the institution, and three of the trustees, A. E. Carlton, Harry M. Rubey and James T. Smith.

Mine Gas has from time to time given considerable trouble in some of the well-known metal mines of Colorado. For several years, the sinking operations and development in the bottom level of the Blue Bird mine, in Cripple Creek district, were hampered by gas. In this property, relief was sometimes obtained by laying a water pipe in the drift and spraying water at points where the gas appeared to collect. Less trouble was experienced in the bottom of the shaft, so long as the bottom was just within the water level of the district. This gas appeared to produce a choking sensation but did not seem to be poisonous. In another mine in the Cripple Creek district, the Wild Horse, the mine gases seem to give trouble under low barometric conditions. The effect of the gas is being combated by setting bulkheads at every level of the main shaft, so that the miners can work under a slight air pressure sufficient to keep the gas out of the workings.

LEADVILLE—Nov. 10

Shortage of Railroad Cars at the mines, in Leadville district, recently resulted in greatly reducing production and placing a large number of men out of employment. Normally, the combined output from the mines is 61,000 tons a month. During October, this total was reduced to 40,000 tons, but the shortage is now nearly overcome. The D. and R. G. handles fully 90% of the output of the district, and the fact that it is now necessary to furnish standard-gage cars to the hill mines makes the situation that much more difficult. At the large mines closer in, no men were laid off although the output was reduced. These companies undertook development to keep the men at work, while there was a lack of cars. Among these companies are the Iron Silver, Western, and Down Town Mines Co. Manganese producers, believing that the Government would soon demand the shipment of their ores, continued to break ore at the usual rate. The Cramer Leases, Grey Eagle, Bohen, and Nisi Prius, have a combined output of 500 tons daily under normal conditions.

SALT LAKE CITY—Nov. 9

New Power Line is being built by the Utah Power and Light Co., from the Cardiff mine, along the south fork of Big Cottonwood Canyon, and up over the divide near the West Toledo and Columbus-Rexall into Alta. This is nearly completed and will connect with the power line of the Wasatch Mines Co. by the first week in November. The power plant of the Wasatch Mines Co., in Little Cottonwood, has been giving good service, but in cold weather the flow of water in the canyon is sometimes reduced so low, that it is not possible to furnish power to all of the mines. When the new line has been connected, it will do away with difficulties in cold weather, and insure abundant power at all seasons.

JOPLIN—Nov. 10

Organization of Mine Operators for the Oklahoma section of this district has been virtually accomplished. At a complimentary luncheon given by the Admiralty Zinc Co. on Nov. 6, over 40 operators, representing most of the large companies in the field, agreed that an organization was needed, and elected A. E. Bendelari, manager of mines for the Eagle-Picher Lead Co. in this district, as permanent chairman, with authority to appoint finance and membership committees to complete the organization. It is planned to raise $25,000 and build a club house on the top of what is known as Blue Mound, in Kansas, just across the state line, north of Picher. It will be a safety and sanitation association, such as has existed successfully at Webb City, Mo., for two years, and the primary purpose will be to improve conditions in the new field. A membership of 500 will be attempted.

Water at Admiralty Zinc Co.'s mines, at Douthat, Okla., will be handled by a method used with success elsewhere and introduced into this district by O. F. Brinton, manager. The mines are near two creeks, and the beds of each of these small streams have been gone over and all crevices and holes that seemed to lead underground have been caulked with a mixture of concrete and clay. This has been done on each stream for several hundred yards near the mines. Also all drill holes and other openings in sinks or depressions near the mines have been stopped with the same mixture. Damming was not necessary in the creeks, but the water was diverted to one side and half the bed fixed at a time. As a result of this work, the water problem is nearer solved at the Admiralty properties than at any time since work was begun. At the No. 4 mill, just completed, there is only sufficient water to use in the mill, although operations will be conducted at 220 ft. Several 10-in. centrifugal pumps were used for months at the Admiralty, but it was only after the plan above described was put into effect that real headway against the water was accomplished. It is the belief of Manager Brinton that they were pumping the same water over and over before stopping the "surface leaks."

SPOKANE, WASH.—Nov. 9

Unfairness of Federal Tax Law, in basing the amount of taxes to be paid on the capitalization was discussed at a meeting held here. A large number of mining men and their lawyers from eastern Washington, northern Idaho and western Montana were present and the views expressed were so widely divergent that anything like concerted action was out of the question. It was finally agreed to seek more

light from the Federal authorities. It was shown that unfair charges would be imposed if taxation was based on capitalization as some properties of equal value were capitalized differently. Comfort was taken from a statement in the law which permits the exercise of discretion by treasury officials. It was held that the Government would act fairly if informed of the conditions, but it was urged that pains be taken to supply the information. An illustration of the inequality of the proposed tax was shown by a comparison of the American Smelting and Refining Co. and the Hecla Mining Co. The smelting company with a capitalization of $117,000,000 and an income of $29,000,000, would be taxed only $2,600,000, or 9.01%, while the Hecla company with a capitalization of $250,000 and a net income of $2,000,000 would be compelled to pay 52.5%. The burden is made heavier at this time by the new low levels for lead, the high cost of supplies and machinery and the higher rate of wages, it is held. The tax will be greater than many mines can stand and greater than Congress intended they should stand, it is believed. "For my part I would be willing to give the mine to win the war," said Roy Young, manager of the Electric Point Mining Co., of Northport, Wash. "But I see no fairness in a plan of war taxation that takes a large part of the earnings of one mine and a small part of another. I have no doubt but that there will be a satisfactory adjustment when a clearer understanding of the situation is given the national heads."

HOUGHTON, MICH.—Nov. 10

Mining Costs of 1917 will be higher for Lake companies than at any time within the last 30 years. Omitting all consideration of the higher wages, the highest in the history of the district, the cost of supplies has advanced to a startling extent. Coal is costing the average independent producer 90% more than last year, and then it was higher than it had been for 25 years. Powder is up 100%, and the powder companies are making no contracts with the mines, the Government having the first call on the output. Steel rails are up 110% over the prices of a year ago. And the worst feature about steel rails is that the best delivery is three or four months. Carbide ordinarily can be bought for $57 a ton, now it is $115 a ton, and almost impossible to secure even at these high prices. Most of the mines here have purchased carbide from Duluth jobbers. The last carload they had in Duluth got here a week ago. The jobbers tried to buy some in Europe, and found it is selling for $400 a ton in that market. Under the circumstances, any mine manager who keeps his mining costs down to within even a 25% increase of the costs last year, will be accomplishing wonders.

Reworking Stamp Sands will probably be attempted before long at several of the old mill sites in Keweenaw County. It is understood, the Calumet & Hecla Mining Co., which controls the Delaware, is going to retreat the old Delaware sands. Regrinding and leaching processes will be used in this work, although it is probable that eventually the finer sands and slimes will be treated with the flotation process, as well. It is said that the Delaware sands will run close to 6 lb. per ton in copper and that 4 to 5 lb. can be recovered, probably at a cost of under 7c. per lb. It is hardly likely that expensive plants, similar to those in use by the Calumet & Hecla at Torch Lake, will be erected in Keweenaw County. This would mean big initial expenditures as well as costly upkeep, while the sands can be transported to Lake Linden at comparitively low costs. There is possibly half a million tons of the Delaware sands. Then, at the old Allouez Cliff and Central mill sites are hundreds of thousands of tons more, all of which can be handled cheaply. At the Central and the old Allouez mill locations, the sands likely will not run so high in copper as those at the Delaware but it is believed there is sufficient content to make the operations pay. At the Cliff a great deal of rich sand is scattered about. For some time past tributors have been working over some of the old stockpiles at the Cliff and reported to have been taking out considerable copper in nuggets, small masses and coarse copper, the latter from the sands. All through Keweenaw County, at a dozen or more old mine locations, are piles of stamp sands that can be worked over at a profit. The wonder to many mining people of this region is that the work has never been undertaken, for there is no expensive mining to be done. Not until a southern Michigan concern attempted to contract for a quantity of Delaware sand to use in manufacturing shingles for fireproof structures was serious thought given the matter.

DULUTH, MINN.—Nov. 10

Shipments from Lake Superior district of iron ore will show a falling off of about 6,500,000 tons for this season, as compared with the 1916 record of 65,188,648 tons, according to present indications. Besides having a bad start through the late opening of navigation last spring, a number of adverse factors contributed, including: Labor shortage; ruling by National Defense Committee that only sufficient ore to supply requirements of blast-furnace operators until next June should be carried to the Lake Erie docks; lastly, the unusually cold weather of last month has been a serious hindrance to the ore movement. On a number of days during October, the ore became frozen and it was necessary for the cars to be steamed at Proctor and Two Harbors before proceeding to the docks.

DEADWOOD, S. D.—Nov. 10

Construction in 1917 in various sections of the state includes: In Lawrence County, the construction by the Homestake company of a second power plant on Spearfish Creek, at Maurice, just above the intake to its present plant. The water will be taken from Little Spearfish Creek and a part from the main creek above Savoy and flumed to the site about eight miles' distant; the pipe installation has been completed and the new unit will be installed soon after the first of the year. The Custer Peak Copper Co. has completed, at its property near Nahant, a concentrator comprising 10 stamps, Harz jig, ball mill and four Wilfley tables; the plant was placed in commission on native copper ore in September. In Pennington County, the Homelode company, near Silver City, installed an amalgamation-concentration plant which has been in operation several months. The equipment consists of a 10-ft. slow-speed Lane mill, plates and concentrating tables. In Meade County, the U. S. Gypsum Co. has erected a modern 100-ton plaster mill at Piedmont. The Dakota Plaster Co. has erected a plaster mill at Black Hawk to replace the one destroyed by fire. The Refinite Co. at Ardmore, Fall River County, has completed a plant for the calcining of kaolin, with a capacity of 10,000 lb. of dried product per day. The Spokane Lead and Silver Co. at Spokane, Custer County, has completed the foundations for the new concentrator to be erected.

TORONTO—Nov. 8

Tax on Canadian Copper Co., subsidiary of the International Nickel Co., under the retroactive-tax legislation for operations covering the last two years, amounted to $1,366,892. This is the largest check ever received by the Ontario treasury. The tax is based on the market value of the refined product allowing for cost of refining and marketing.

Gold and Silver Discoveries at different places have been reported. A 6-in. vein carrying native silver in Bernhardt Township, a few miles north of Kirkland Lake, is stated to have widened in the test pit. A large pyrite dyke on claims owned by Fred Dwifee and Charles Ross, in Boston Township, is stated to show good gold and silver contents. Silver is reported to have been found in Corkill Township, in the Gowganda mining division, about 15 miles southwest from Elk Lake.

The Mining News

ALASKA

ALASKA UNITED (Treadwell)—Ready Bullion mine produced in September 8015 tons, yielding $18,623; operating expenses, $26,005; operating loss, $7382; construction expense, $3311; net loss, $10,693. The 700 Claim produced no ore, 7.97 tons concentrates being saved from cleanup. Ready Bullion did 589 ft. development on 2200- and 2400-ft. levels. Increase in stock of broken ore, 4145 tons.

ARIZONA

Cochise County

SHATTUCK ARIZONA (Bisbee)—Produced in last 10 months, 10,531,089 lb. copper, 1,884,956 lb. lead, 134,729 oz. silver and 1352.90 oz. gold. Production for October amounted to 808,518 lb. copper, 44,161 lb. lead, 10,251 oz. silver and 66 oz. gold, comparing with 711,924 lb. copper, 41,362 lb. lead, 3631 oz. silver and 85 oz. gold in September.

Gila County

INSPIRATION (Miami)—Production for October amounted to 2,400,000 lb. against 2,250,000 lb. in September and 11,300,000 lb. in October, 1916.

Mohave County

GOLD ORE (Goldroad)—Installation of new mining equipment completed; shaft sinking under way.

UNITED OATMAN (Oatman)—Crosscut east started 600-ft. from portal and work in face discontinued.

MOSS BACK (Oatman)—Preparations being made to sink shaft to 500-ft. depth. W. H. Holcomb, manager.

Pinal County

RAY & GILA VALLEY RAILROAD made application for rehearing of Arizona Hercules Copper Co. case, in which latter seeks to compel the railroad to build spur to company's mine and another to mill at Kelvin. Hearing set for Nov. 10.

RAY CONSOLIDATED (Ray)—Production for October amounted to 7,700,000 lb. copper, comparing with 7,413,000 lb. in September, and 7,590,000 lb. in October, 1916.

SILVER KING OF ARIZONA (Superior) Unwatered to 250-ft. depth; being retimbered, crosscut being driven on 120-ft. level to cut orebody. Former silver producer. A. W. Hillebrand, New York, president; W. F. Ainsworth, manager.

Yavapai County

JEROME VERDE (Jerome)—It is rumored that United Verde Extension exercised an option to purchase 600,000 shares at 50c. per share about 30 days ago. Stock, however, has lately suffered a severe decline on New York Curb.

ARIZONA NATIONAL MINING (Prescott)—Operating Arizona Lookout mine at Humboldt. Reported in "Journal," Oct. 27, under Anderson & Birch, as having recently shipped high-grade lead-silver ore. Has been sending out shipping-grade ore during last two years; milling second-class ore; using flotation. F. M. Anderson, president; Sidney Birch, vice president.

Yuma County

UNITED MINES (Bouse)—Main crosscut on 650-ft. level stopped 370 ft. from inclined shaft. Temporary concrete bulkhead put in 240 ft. from shaft to stop water; unable to handle with present equipment. Drifted on fault vein, face 170 ft. from crosscut in altered rock containing hematite, quartz and spar. Expect to install another compressor unit to allow continuation of bulkheaded crosscut and drift to the north and crosscut to west to expose granite contact, where surface indications are favorable.

ARKANSAS

Boone County

GLORIA (Zinc)—Holding three cars zinc-silicate ore for higher price. Other operators doing likewise.

Marion County

SALINA (Dodd City)—Resumed development.

DIXIE (Buffalo)—A. H. Cofer reports free and disseminated ore in new tunnel.

GOODLUCK (Rush)—New tunnel in zinc-carbonate ore; 20-ton shipment made last week. Leased by Householder & Bower.

Searcy County

LUCKY DOG (St. Joe)—Installing additional machinery.

WAKEFIELD (Pindall)—Moore Williams and associates recently purchased 10-acre Wakefield lease, on American Zinc,

Lead and Smelting Co.'s land; opening carbonate of zinc. Will install hand jigs.

CALIFORNIA

Amador County

EAST EUREKA (Sutter Creek)—Stamp mill and other surface-plant machinery being dismantled and sold; has been idle for long time. Several unsuccessful attempts made in last five years to reopen.

Butte County

CHROME DEPOSIT being operated at Swayne in Feather River Canyon. First car of ore shipped Nov. 3; expect to ship one carload a day. Operated by Norris & Noyes, of San Francisco. Ore is hauled by motor trucks to the Swayne tramway, thence sent to the Western Pacific, and marketed at Niagara. Same operators reported to have optioned manganese mine at Clipper Mills.

BLOOMER HILL (Oroville)—To be reopened by Philadelphia and Seattle men. New flume line under construction. Mill and hydro-electric plant contemplated. Former producer under name of Chambers mine. Reported that $25,000 will be spent to develop ore at depth.

Humboldt County

FOREST FIRES spread from Eureka into Del Norte County; reported that no lives have been lost.

Kern County

BUTTE (Randsburg) — Will continue milling low-grade ore from large dumps, averaging about $6 per ton, instead of extracting new ore.

Nevada County

WASHINGTON ASBESTOS (Washington)—Ten of 20 stamps of Fairview mill dropping on asbestos ore. Reported teams hauling product to Nevada City for rail shipment to Oakland. John D. Hoff, of Oakland, president.

Placer County

CHROME MINING in Forest Hill district still active and some good-sized deposits disclosed; most of deposits are small and scattered, but small cost of extraction and hauling and high price of clean ore make chrome mining profitable.

Plumas County

DROEGE (Greenville)—Main lode prospected near surface for distance of nearly a mile disclosing good ore in depth. On Phoenix claim, vein of sulphide ore proved to 350-ft. depth, by shaft.

Tehama County

TEDOC MINING CO. (Red Bluff)—Contracted with J. B. Lukens to haul chrome ore over 12 mile road from mine to Harrison Gulch road. Lukens using White motor trucks. From Harrison Gulch road to Red Bluff hauled by George A. Shepard over road recently completed by Tedoc company. Expected to get out 2000 tons before winter storms block upper road.

Trinity County

THREE GOLD NUGGETS valued at total of $1555 taken from recent cleanup by Patrick Holland near Coffee Creek on Trinity River, being largest found in county for several years. Several $50 pieces found in cleanup. Run for the season totaled about $1200.

Tuolumne County

DREISAM (Soulsbyville) — High-grade ore from large lode.

CONFIDENCE (Confidence)—Ball mill to be installed.

GOLDEN GATE (Sonora)—Machinery sold to Angels Iron Works; will be hauled to Jamestown for rail shipment to Angels Camp.

MONARCH GRAVEL MINING CO. (Confidence)—Supplemental permit issued to sell 3000 shares at $2; proceeds for development.

San Bernardino County

AFTERTHOUGHT (Ingot)—Dryer will be installed soon, when flotation mill will begin operating. Miners being increased. John T. Milliken, superintendent.

MAMMOTH (Kennett) — More skilled miners working at Stowell, Delta Consolidated, Friday-Lowden. In main Mammoth mine, new ground being opened. Production for October estimated to be 1,590,000 lb. copper.

CLARK MOUNTAIN MINING CORPORATION (Los Angeles)—Authorized to sell 25,000 shares at 50c. Recently optioned Silver King and Silver King No. 2 claims in Clark Mountain district. Agrees to pay Morris Cohen 101,000 shares of stock and one-fifth of smelter returns up to total of $10,000. All shares in escrow pending further action of commissioner of corporations.

CELESTITE DEPOSIT at Ludlow, known as Ward claims, reported optioned by Frank G. Mernard, of New York. Celestite occurs here and in Inyo County with colemanite. Sulphate of strontium is found in California only in Calico and Death Valley regions, according to the State Mining Bureau. Records show the carbonate occurs in Genessee Valley, Plumas County.

ATOLIA-RANDSBURG TUNGSTEN region reported active. "Spud-Patch" situated between these towns producing 20 tons high-grade ore per month. Vinton Durand taking out 20 lb. daily besides fines which are concentrated; James Rice producing ore containing 60 lb. per ton, treated by wet concentration; D. A. Blue and Charles Walton leased Skylark claim in Osdick group, including mill. Round Valley mine producing 12 tons daily. Scheelite strike reported at Holcomb Valley, near Bera Valley dam.

COLORADO

Boulder County

WHITE RAVEN (Ward) — Producing good silver ore.

CATASTROPHE (Boulder) — Is being developed under lease by I. N. Behr. Crosscut from tunnel level opened 10-in. vein of tungsten ore.

UP TO DATE (Boulder) — Recently shipped ore carrying gold, silver, lead and copper. Developed for several years. Will be worked through deep main-haulage tunnel.

Clear Creek County

NEW ERA (Freeland)—Mill running two shifts.

FRISCO (Empire)—This Daily district mine shipping lead-carbonate ore.

COLORADO CENTRAL (Georgetown)—Compressor plant and saw-mill being built.

PAY ROCK (Silver Plume)—Company recently organized to reopen mine.

BIG FIVE (Idaho Springs) — Several lessees operating through tunnel with success.

ASHBY TUNNEL (Silver Plume)—Extensive crosscutting planned; vein on this level is large, but oreshoots not yet opened. Pay ore continuous above from surface to 600-ft. level.

HALL TUNNEL (Georgetown) — This and all Husted holdings under bond and lease. Tunnel in 2000 ft., will be driven 1300 ft. to cut extension of Colorado Central and Aliundi veins. Other properties will be merged in general scheme of development.

Dolores County

CADIZ (Rico)—Property will be developed

Gilpin County

BEZANT (Central City) — Being unwatered.

PITTSBURGH (Central City) — Stated 50-ton mill will be built by Cashier Co.

FEDERAL (Central City)—This Russel Gulch mine will be reopened.

ANNEX (Central City)—Lease and bond taken; gasoline hoist being installed to unwater mine. Shaft is 240 ft. deep. Former gold producer.

CROWN POINT (Central City) — This property, near Gilpin-Clear Creek county line, will be worked by Idaho Springs men. Will be drained to 400-ft. level, and crosscutting done.

Ouray County

HIDDEN TREASURE (Ouray)—Mine being cleaned out and retimbered for examination. Owned by Mrs. Thomas F. Walsh, Washington, D. C.; former producer of high-grade lead-copper-silver ore, changing at depth to milling-grade, complex sulphide. Vein will be cut at depth, and probably drained by new Camp Bird tunnel.

GENESEE (Ouray)—Genesee-Vanderbilt, Yankee Girl, Robinson, Joker Tunnel and others in Red Mountain district will be operated by one company. Former producers of high-grade copper-silver ore, and closed down after drop in silver price. Joker Tunnel driven to unwater old mines finished but promoters lacked funds to continue work. These properties worked during last year under lease to James M. Hyde.

HIGHLAND MARY (Silverton)—Shipping copper ore. Improving equipment.

San Juan County

BELCHER (Silverton)—Reopened and being developed. Ferguson and Marshall, operators.

SUMMIT COPPER MINING CO. (Silverton)—Will ship while Silverton and Northern R.R. remains open. Worked through Koehler tunnel. John Kennedy, manager.

San Miguel County

BELMONT-WAGNER DEVELOPMENT CO. (Telluride)—Subsidiary of Tonopah Belmont Co., of Nevada, that recently acquired Alta mine, formerly operated by Wagner Development Co. Office building and boarding houses enlarged, and terminals for aërial tramway to mill from Palmyra mine recently opened up, constructed.

Summit County

MINNIE (Breckenridge)—Lead sulphide ore, carrying silver, shipped by lessees.

ELLA (Breckenridge)—Lessees shipping good-grade oxide ore to Salida smeltery.

FIRST NATIONAL (Breckenridge) — Lessees opened shipping grade ore in 339-ft. level of this Iowa Gulch mine.

Teller County

VICTORY GOLD (Cripple Creek)—Ore opened in development work on 425-ft. level from Beacon shaft of Prince Albert group.

PORTLAND (Colorado Springs)—Unit will be added to Independence mill; as originally planned with five units, is in operation, treating 1250 tons daily.

QUEEN BESS (Cripple Creek)—Development from 1000-ft. level of El Paso Gold King shaft opened good-grade ore; shipping 2-oz. gold ore.

CRESSON (Cripple Creek)—Recent development on 1400-, 1500-, and 1600-ft. levels opened good-grade ore. Has cash on hand for one year's dividends and three years' dividends in ore reserves.

GEORGIA

ARIZONA & GEORGIA DEVELOPMENT CO. (Temple)—Operating Tallapoosa mine, 12 miles distant, in Haralson County. Expect to complete 30° incline to surface soon. Plans to sink 500 ft. further to provide stoping ground, and to crosscut at 230-ft. depth on pitch; development at present extends to 315 ft. Hauling surface ore to No. 48 siding, also called Morgan's. J. W. Tudor, in charge.

MICHIGAN

Copper

WHITE PINE (White Pine)—Flotation plant will be ready shortly after Jan. 1.

LA SALLE (Calumet) — In high-grade rock for last three weeks on 45th level.

KEWEENAW COPPER (Calumet) — Shipping better rock for last 10 days.

SENECA (Calumet)—Will start sinking shaft in about five weeks.

MASS (Mass)—Shipping 1000 tons daily with favorable prospect of getting more men and increasing output.

BALTIC (Baltic)—No. 2 shaft down to 32nd level, No. 3 to 34th. No. 2 shipping over half of mine rock.

WHITE PINE EXTENSION (White Pine)—Drifts on 2nd level, 2450 ft. long and on 4th level, 1100 ft.

HANCOCK (Hancock)—Production for October amounted to 332,000 tons, as compared with 350,000 for September.

SOUTH LAKE (Lake Mine)—Shortage of experienced men caused shutdown on night shift. Indiana only running day shift for some time past.

VICTORIA (Victoria)—Management decides to continue production during winter, but construction and development suspended; costs recently above 23½c.

NEW ARCADIAN (Houghton) — Shaft, down 1730 ft., cut branch of New Arcadian lode in hanging wall, sometimes a short distance from main lode and sometimes merged into it. At 250-ft. level, lodes were 150 ft. east, and at 1700-ft. about 50 ft. east.

Iron

LUCKY STAR MINING CO. (Negaunee)—Has men working in Prince of Wales mine, drifting from old workings into large orebody on Lucky Star adjoining, which plan permits large saving in cost. Oliver Iron Mining Co.'s lease of latter expired in June and mine reverted to Breitung interests operating the Lucky Star, which is a new mine owned jointly by the Arctic Iron Co., a subsidiary of Cleveland Cliffs Iron Co., and Breitung-Kaufman interests, and operated by agreement by the latter. Company known as Lucky Star Mining Co., N. M. Kaufman, president; W. G. Mather (President, Cleveland-Cliffs Iron Co.), vice president; E. N. Breitung, secretary and treasurer.

MINNESOTA

Mesabi Range

SOUTH AGNEW (Hibbing)—Jones & Laughlin started sinking large shaft last week.

MISSISSIPPI (Keewatin) — Jones & Laughlin resumed operations last week after two-year shutdown. Building 150-ft. concrete smokestack at power plant.

BENNETT (Keewatin) — Operated by Pickands, Mather & Co. Recently moved office and engineering staffs into new steel-and-concrete building.

ADAMS AND SPRUCE (Eveleth)—These mines of Oliver Iron Mining Co. will be stripped requiring complete change of depot and warehouse tracks of Duluth, Missabe & Northern Railway.

SCRANTON (Hibbing)—Lease, owned by Lackawanna Steel Co., with Pickands, Mather & Co. operating and handling sales, reported taken over by Hoyt Mining Co. and various steel companies.

BRUNT (Mountain Iron)—Operated by Hanna Ore Co. Baumgartner Co., of St. Paul, have steam shovel working, making new yards for Great Northern R.R. at mine; Duluth Missabe & Northern Ry. have been hauling up to present.

MISSOURI

Joplin District

WAYLAND (Galena, Kan.)—Now in ore at 234 ft. in shaft. This is first operation at this depth in Galena camp.

PRODUCERS (Joplin)—Moving mill from here to lease recently drilled, northwest of Picher, Okla. Two shafts sunk to ore level.

LAURA G. (Joplin)—Will reopen Beacon Hill and Three C leases on Leonard land, north of Chitwood. To try operations at 210 ft. soon.

BILHARZ (Baxter Springs, Kan.)—Decided to rebuild Bluebird mill, north of Commerce, completely destroyed by fire two weeks ago.

RANGE LINE (Joplin)—Sinking second shaft on mill site on Rex M. & S. land. Will move mill from another portion of tract to new mine. Operations at 130 ft. J. F. Brewer, manager.

N. J. & B. (Duenweg)—Completed 150-ton mill on lease of Walker land, north of town. Lead, calamine and blende from 110 to 188 ft. Principal run at 149 ft., where blende encountered. J. H. Johnson, principal owner and manager.

ADMIRALTY ZINC (Douthat, Okla.)—No. 4 mill completed; electrically equipped; capacity, 600 tons. Has four jigs, seven sets of rolls, 14 tables, Dorr thickener and classifier. Operations to be conducted at 220-ft. level; two shafts down to this level and connected.

GOLDEN ROD (Oklahoma City, Okla.)—At No. 1 property, just south of Picher, made 301 tons of concentrates last week from 1804 tons of sulphide ore. Operating at 220 ft.; heavy water preventing former owners from working at this depth. Concentrates averaging 62% metallic zinc, with 0.2% lead and 1.15% iron.

MONTANA

Cascade County

ANACONDA (Great Falls)—Zinc plant operating at capacity; will be increased considerably when new roasters are installed. Foundations for wire mill completed; plant to be completed about May, 1918.

Deerlodge County

NATIONAL TUNGSTEN AND SILVER CO., at Windy Gap, about 26 miles from Anaconda, began operating mill last month on 1000-ton wolframite ore reserve. Vein is 6 ft. wide. Also operating Hidden Lake mine, in Cable district, former gold producer, where 150-ton cyanide plant is under construction.

Jefferson County

MT. WASHINGTON (Wickes) — Two carloads a day to smeltery.

FREE COINAGE (Clancy)—Unwatering 180-ft. shaft. Silver-zinc ore.

Silver Bow County

BUTTE-COPPER CZAR MINING (Butte)— G. B. McDaniels killed Oct. 28, by 100-ft. fall while being hoisted in bucket.

ANACONDA (Butte)—Tropic mine in eastern section resumed night shift on Oct. 28; shipping regularly. During August, 17 accidents occurred at Butte mines, being 1.01 accidents per 10,000 shifts; 16 mines had no accidents.

BUTTE-RAMSDELL COPPER (Butte)—Situated in center of city. Sinking two-compartment shaft on Ramsdell started three months ago and now down to 165-ft. depth; encountered vein on 150-ft. level, carrying copper, zinc and silver. Shipments of 50 tons a day will be increased when equipment is installed. Henry Malloy, president; John D. Pope, vice-president.

NORTH BUTTE (Butte)—Report for quarter ended Sept. 30 shows Granite Mountain shaft retimbered and 225 ft. of structural steel put in place, 30 ft. of which is completely concreted; 195 ft. reinforced concrete placed below 2600-ft. level. Speculator shaft repaired and being used for hoisting ore and for lowering supplies to the Granite Mountain shaft. Shaft at Sarsfield claim is 305 ft. deep; installing surface plant has 5000-gal. tank for water supply. Another suit for $65,000 for death of John J. Brady in Granite Mountain fire filed.

NEVADA

Clark County

GREEN MONSTER (Goodsprings)—Small body zinc ore carrying some copper and lead opened. Orebody is a replacement in limestone. Owned by Hearst Estate. C. B. Neal, superintendent.

Nye County

TONOPAH ORE PRODUCTION for week ended Nov. 3 amounted to 10,223 tons, valued at $178,902, comparing with 10,578 tons the previous week. Producers were: Tonopah Belmont, 2415 tons; Tonopah Mining, 2850; Tonopah Extension, 2380; Jim Butler, 800; West End, 913; MacNamara, 476; Montana, 105; Rescue, 195; Midway, 89 tons.

MANHATTAN RED TOP (Manhattan)—Shaft down 167 ft. vertical; abnormal flow of water now overcome with addition of No. 7 Cameron pump. New wagon road completed.

Washoe County

NIXON NEVADA (Reno)—Developing with 30 men; taking out copper ore. Shipped 14 carloads during summer. Seven veins on surface. Situated 14 miles north of here.

White Pine County

NEVADA CONSOLIDATED (McGill)—Production of copper amounted to 7,000,000 lb. in October, comparing with 6,524,352 lb. in September and 8,676,327 in October, 1916.

NEW MEXICO

Grant County

CHINO (Santa Rita) — Production for October amounted to 6,333,000 lb., comparing with 7,719,496 lb. in September, and 6,921,081 lb. in October, 1916.

GOLD BUTTES MINING AND MILLING (Duncan, Ariz.)—Situated in Steeple Rock district; consists of three groups; Rival Mining Co. extension of 180 acres to southeast and 520 acres to northwest and Dark Thunder Mountain Copper Group of 120 acres. Development work consists of 4000 ft. exposing gold and silver ore. Examined by E. T. Morton, Clifton, Ariz. J. F. Fraser, president.

OKLAHOMA

OSAGE INDIAN OIL LEASES, covering area of 20,000 acres, were sold Nov. 12 for $1,687,000, as announced by Secretary Lane. The Indians will also receive a royalty of one-sixth upon the oil taken out.

SEVENTEEN I. W. W.'S IN TULSA, Okla., were flogged, tarred and feathered by band of 60 black-robed and hooded "Knights of Liberty." Regarded as a sequel to the recent I. W. W. activities, including the dynamiting of home of J. Edgar Pew, vice president of the Carter Oil Co. The latter outrage was assumed to be part of plan to terrorize the oil industry.

OREGON

Jackson County

BLUE LEDGE (Medford) — Surveying route for railroad from Grant's Pass to this copper mine. A. H. Wise, of Grant's Pass, Ore., in charge.

UNITED COPPER CO. (Medford)—Copper King mine near here leased by W. M. Cowley, president of Cowley Investment Co., and Howard H. Startzman, of Seattle. Developing.

RED OAK (Gold Hill)—This placer mine on Galls Creek, three miles southwest of here, under lease to M. G. Womack of Medford, Ore., and M. A. Carter, of Ashland, Ore. Reopening with small crew of men.

Josephine County

CHROME ORE being hauled from deposit on old McGrew road, 15 miles southwest of Waldo, Ore., by J. H. Gregg.

JACK AND TOM (Kerby) — These chrome claims located a few weeks ago, showing considerable high-grade ore; will haul to Waters Creek. J. M. Finch and T. P. Johnson, owners and managers.

UTAH

Salt Lake County

WEST TOLEDO (Alta)—New equipment to be installed on divide between Alta and Big Cottonwood. Working from Alta side.

UTAH COPPER (Bingham)—Production of copper for October amounted to 18,100,000 lb., comparing with 17,839,378 lb. in September, and 20,325,520 lb. in October, 1916.

OHIO COPPER (Bingham)—Concrete foundation for new 3000-ton flotation plant built, and machinery en route. Experimental flotation plant recovering 85%, compared to 40 and 50% formerly.

CARDIFF (Salt Lake)—Shipping from stockpile, since smelter embargo lifted, about 50 tons daily, compared with 100 to 135 tons normal daily output; conserving ores awaiting better lead prices and concentrating on development and mining ore, which is being held.

Utah County

PACIFIC (American Fork)—Mill of Fissures Exploration Co. producing car of concentrates about every three days. Strike of shipping ore reported.

MINERAL FLAT (American Fork)—Being developed by same interests as Miller Hill; prospect and drainage tunnel 3000 ft. long driven. Three fissures cut and fourth expected soon.

MILLER HILL (American Fork)—Tunnel in about 2200 ft. cut two fissures 60 ft. apart. First fissure being explored by drifting and raising; crosscutting from here to reach second fissure. J. C. Jensen, vice-president, and W. Lester Mangum, general manager.

CANADA

Alberta

PEACE RIVER OIL (Peace River)—Flow increased by dynamite. Oil sands are about 70 ft. thick; drill has so far entered only 20 ft.

Manitoba

REX (Herb Lake)—Report of E. E. Chase, of Denver, Colo., says vein averages 3 ft. wide, opened for 1700 ft. with filling of quartz carrying free gold. Being operated by Mines Exploration Syndicate organized by Makeever Bros. Shaft 120 ft. deep; drifting north and south on orebody. Walter Neal, general manager; Charles Crook, superintendent.

Nova Scotia

NOVA SCOTIA STEEL AND COAL CO. (New Glasgow)—This company reports production for the quarter ended Sept. 30 as follows, in gross tons: 139,795 tons coal; 7174 tons iron ore; 17,069 tons limestone; 25,268 tons coke; 21,874 tons pig iron; 30,847 tons steel ingots and 32,657 tons finished steel and forgings.

Ontario

SPANISH RIVER CLAIMS in township of Shakespeare, containing total of 80 acres, six miles north of Webbwood, examined by A. G. Morrison preparatory to diamond drilling.

PATRICIA SYNDICATE (Boston Creek)—Active development being undertaken. Shaft down nearly to 50-ft. level in ore.

DOME LAKE (South Porcupine)—Annual report estimates ore reserves at 9089 tons, averaging $9.03 gold contents per ton.

NEWRAY (South Porcupine)—Shareholders ratified sale of controlling interest to Crown Reserve and increase of capital from $1,500,000 to $3,000,000.

ADANAC (Cobalt)—New vein encountered at 310-ft. level about 6 in. wide, carrying smaltite and native and ruby silver.

PRESTON (South Porcupine) — This property (which does not include the Preston East Dome mine), optioned by Hayden mine interests.

MEXICO

CARNEGIE LEAD AND ZINC (Cananea, Sonora)—Bond issue for $250,000 for funds to erect mill decided upon at special stockholders meeting. New plant designed by J. F. Sanford, superintendent; machinery ordered. Announced company has $71,000 in bank and $8000 due from smelters.

CHILE

CHILE (Chuquicamata)—Copper production in October amounted to 9,050,000 lb., comparing with 3,294,000 lb. in September.

PERU

CERRO DE PASCO (La Fundición)—Production of copper in October amounted to 7,325,032 pounds.

CHOSEN

ORIENTAL CONSOLIDATED (Unsan)—By telegraph, October cleanup amounted to $120,153. September bullion amounted to $105,940, divided as follows: Tabowie mill, $25,316; Taracol mill, $20,127; Maibong, $14,302; Taracol cyanide plant, $42,356; Maibong tube mill, $3837. Low cleanup due to rains in September and low-grade of ore; rainfall was 12⅛ in. and skips were kept baling in addition to pumping to prevent flooding of mines; Taracol mine flooded. Shortage of native labor at present due to harvest season.

The Market Report

SILVER AND STERLING EXCHANGE

Nov.	Sterling Exchange	Silver New York, Cents	Silver London, Pence	Nov.	Sterling Exchange	Silver New York, Cents	Silver London, Pence
8	4.7515	86½	44	12	4.7515	86¼	43¾
9	4.7515	86½	43¾	13	4.7515	86	43⅝
10	4.7515	86⅜	43¾	14	4.7515	86	43⅝

New York quotations are as reported by Handy & Harman and are in cents per troy ounce of bar silver, 999 fine. London quotations are in pence per troy ounce of sterling silver, 925 fine.

DAILY PRICES OF METALS IN NEW YORK

Nov.	Copper Electrolytic	Tin Spot.	Lead N. Y.	Lead St. L.	Zinc St. L.
8	*23½	72	6½ @6⅝ 6¼	6.17½ @6.37½ 6.17½	7⅛ 7⅛
9	*23½	72½	@6½	@6.37½ 6.17½	@7⅛ 7⅛
10	*23½	72½	6¼ 6.20	@6.25 6.15	@7⅛ 7⅛
12	*23½	72¾	@6.25	@6.25 6.15	@7⅛ 7⅛
13	*23½	73	6¼	@6.25 6.20	@7⅛ 7⅛
14	*23½	74½	6¼	@6.25	@8

* Price fixed by agreement between American copper producers and the U. S. Government, according to official statement for publication on Friday, September 21, 1917.

The above quotations (except as to copper, the price for which has been fixed by agreement between American copper producers and the U. S. Government, wherein there is no free market)are our appraisal of the average of the major markets based generally on sales as made and reported by producers and agencies, and represent to the best of our judgment the prevailing values of the metals for the deliveries constituting the major markets, reduced to basis of New York, cash, except where St. Louis is the normal basing point.

The quotations for electrolytic copper are for cakes, ingots and wirebars.

We quote electrolytic cathodes at 0.05 to 0.10c. below the price of wirebars, cakes and ingots.

Quotations for spelter are for ordinary Prime Western brands. We quote New York price at 17c. per 100 lb. above St. Louis.

Some current freight rates on metals per 100 lb. are: St. Louis-New York 17c.; St. Louis-Chicago, 6.3c. St. Louis-Pittsburgh, 13.1 cents.

LONDON

Nov.	Copper Standard Spot	Copper Standard 3 Mos.	Copper Electrolytic	Tin Spot	Tin 3 Mos.	Lead Spot	Zinc Spot
8	110	110	125	265¾	265	30½	54
9	110	110	125	267½	266½	30½	54
10	...	...	...	...	...	...	...
12	110	110	125	269	268	30½	54
13	110	110	125	273¾	273½	30½	54
14	110	110	125	278	277½	30½	54

The above table gives the closing quotations on London Metal Exchange. All prices are in pounds sterling per ton of 2,240 lb. For convenience in comparison of London prices, in pounds sterling per 2,240 lb., with American prices in cents per pound the following approximate ratios are given, reckoning exchange at $4.75½. £30½ = 6.474c.; £54 = 11.462c.; £120 = 25.473c.; £137 = 29.082c.; £240 = 50.946c. Variations, £1 = 0.212277c.

Metal Markets

NEW YORK—Nov. 14

Lead and zinc are the only metals of major importance in which there is now much market interest. During this week zinc became a little stronger, on small business, while lead held its own on greatly diminished business.

Copper—There were no features of importance that need to be reported.

Copper Sheets have been cut 1c. and are quoted at 33c. per lb. for hot rolled, and 1c. higher for cold rolled. Wire has also been reduced, being quoted at 29c. per lb., f.o.b. mill.

Tin—The advance in this market continued. The volume of business was limited by the supply, which was very small. Banka tin has disappeared from the market and cannot be quoted. Chinese tin is quoted at 70@71 cents.

On Nov. 13 the United States Government requisitioned tin in order to obtain a comparatively small quantity for the Navy Department. Being unable to obtain any from dealers, the metal needed was requisitioned from the cargo of the "Mahopac," which arrived on Monday. This was consigned to dealers who had resold it to consumers. It is unknown what compensation the Government will offer to the latter, to whom the tin really belonged.

Lead—The strength exhibited at the end of last week continued into Thursday and Friday, when large business was done. On Saturday it nearly petered out, and on Monday the market became rather dead, with a tendency toward softness, the price of the A. S. & R. Co. being shaded a little on some transactions. The volume of business done on Monday, Tuesday and Wednesday was relatively light, but more inquiry developed on Wednesday and the tone of the market became firmer. Before the market had become really dull it was easier to sell December lead at an advantage than it was spot and prompt lead. An interesting feature of the week was some transactions in more distant futures—January, February and March—sales for that delivery being made at 6¼c., New York. In the St. Louis market some producers asked 6⅜c. right through the week, but we had no reports of that price being realized by anybody, and during the latter part of the week, when the market was soft, business was done as low as 6.15c. Sales of the week, whereof we had reports, aggregated about 6500 tons, not including a round tonnage arranged with the Government; but, as previously remarked, the bulk of this business was done on Thursday and Friday.

Zinc—The market advanced slightly from day to day on small business, the inspiration for the advance being found in the idea that the Government would soon take some steps to buy zinc. Conferences with the producers were in fact instituted this week, a committee of producers having been appointed to formulate a plan for presentation to the War Industries Board.

Producers of zinc organized a committee Nov. 13 to cöoperate with the War Industries Board in fixing a basis for establishing prices for the various grades of the product. The committee was formed following a consultation on Nov. 12 between the zinc men and Eugene Meyer, Jr., who has charge of purchases of non-ferrous metals for the Government. The members of the new zinc committee are Edgar Palmer of the New Jersey Zinc Co., chairman; Charles T. Orr, Cornelius F. Kelly, C. M. Loeb, Sidney J. Jennings, N. Bruce McKelvie, Charles F. Baker, Walker W. Vick, R. A. Cowles, A. P. Cobb, E. W. Furst, S. M. Evans, J. D. Lang, and S. S. Tuthill. The committee is expected to hold frequent meetings until the necessary data for study by the War Industries Board have been got together. A method for establishing prices for zinc ore is also to be studied and recommended to the Washington authorities.

Zinc Sheets—Price of zinc sheets has not been changed. Market is still at $19 per 100 lb. f.o.b. Peru, Ill., less 8% discount.

Aluminum—This market continues dull with small transactions taking place at 36@38c. per lb. for No. 1 ingots at New York.

Antimony—Dull and weaker. Spot quoted 13¼@13½c. There is no quotation for futures, none being offered. The Chinese and Japanese houses are out of the market for the present. An interesting feature of the antimony market has been some recent transactions in Cookson's. About a month ago the British Admiralty permitted the shipment of about 50 tons to maintain the name of the old brand. This lot was promptly taken up by consumers.

Bismuth—Unchanged at $3.50 per pound.

Cadmium—This metal is quoted at $1.40 @1.60 per pound.

Nickel—Steady at 50c. per lb., premium of 5c. per lb. for electrolytic.

Quicksilver—Strong at $100, with indications that a trifle more would have to be paid for spot, which is becoming scarce. San Francisco reports, by telegraph, $100, strong.

Gold, Silver and Platinum

Gold—Gold in the United States Nov. 1 is estimated by the Treasury Department as follows: Held in Treasury against gold certificates outstanding, $1,481,761,849; held as reserve for Federal Reserve notes, $340,637,000; in Treasury current balances, $197,533,851; in banks and circulation, $1,021,616,341; total, $3,041,549,041. This is an increase of $341,412,065 over the report of Nov. 1 last year.

Silver—The market during the last week has been fairly steady without any marked features. The shipments to London for the week ended Nov. 10 were about 300,000 oz.

Mexican dollars at New York: Nov. 8, 65¾c.; 9, 65¾c.; 10, 65¾c.; 12, 66c.; 13, 66c.; 14, 66 cents.

Platinum—Firm at $105.

Palladium—Still in good demand at $125@130.

Zinc and Lead Ore Markets

Joplin, Mo., Nov. 10—Blende, per ton, high $72.90; basis, 60% Zn, premium, $72.50@70; medium to low, $62.50@55; calamine, per ton, basis 40% Zn, $35@38; average selling price, all grades of zinc, $56.07 per ton.

Lead, high $76; basis 80% Pb, $65@75; average selling price, all grades of lead, $73.10 per ton.

Shipments the week: Blende, 7053 tons, calamine, 844 tons, lead, 1172 tons. Value, all ores the week, $528,370.

An embargo on cars east from St. Louis, coming this week, put several buyers out of the market at the week-end, reducing the sales for next week 30% to 40%. But one company is paying the premium quotation, and aside from its purchases, ore as high in quality is selling on $65 base. The strike of coal miners in Kansas caused the closing of some mills.

Platteville, Wis., Nov. 10—Blende, basis 60% Zn, $62 base for premium ore down to $57 base for medium grade. No market or sales of lead ore were reported. Shipments for the week were 2661 tons of zinc ore and 501 tons of sulphur ore. For the year to date, the figures are 125,140 tons of zinc ore, 6365 tons of lead ore, and 24,698 tons of sulphur ore. Shipped during the week to separating plants, 3543 tons of zinc ore.

Other Ores

Manganese Ore—Metallurgical ore is unchanged at $1.20 per unit.

Molybdenum Ore—Sales reported at $2.20 per lb. on the basis of 90% molybdenum sulphide. For ore assaying less than that 1c. per lb. is deducted for each per cent. down to 85%, after which the deduction becomes 1½c.

Tungsten Ore—Transactions were reported at advancing prices, $26 per unit having been paid for the highest grade of wolframite; that is, ore assaying 70% tungsten trioxide and free from all impurities. Lower grade ore realizes relatively lower prices. We hear of $22 per unit talked about for ore assaying 65%, and $19 for ore assaying 60%. The variations in price, according to the grade and character of the ore, make it difficult to quote an average for this market. Arrivals of tungsten ore from South America are reported as being much curtailed owing to difficulty in doing business with firms who used to ship to this country but have come under the Trading-with-the-Enemy Act. There has been delay in obtaining licenses to deal with those concerns.

Pyrites—Spanish lump quoted at 15c. per unit, on basis of 10s. ocean freight, buyer to pay excess freight and war risk, except that concession of 2% of war risk is

allowed. Ocean rates remain at 35s. for Northern, 40s. for Southern and 42s. 6d. for Gulf ports.

Iron Trade Review

PITTSBURGH—Nov. 13

The different departments of the steel market are giving a different account of themselves, now that price fixing by Washington is practically completed, some departments being active and others very quiet. The sheet market has been decidedly active, inquiry being excellent and sales fairly heavy for shipment during the remainder of this year, with occasional sales for January. Some of the sheet mills had practically run out of orders, and some buyers had run out of material but were unwilling to buy at prices asked. The tin plate mills are still well filled and scarcely any sales are being made.

The American Sheet and Tin Plate Co. will shortly open its books for contracts with manufacturing consumers, for both sheets and tin plates, for the first half of 1918 and this will probably set the pace for the independents.

In wire products and tubular goods there is only moderate activity. The steel-pipe mills have issued new discount cards, based on 51%, using the same differentials as obtained in the cards of Apr. 2 and May 1, while the iron-pipe mills have issued a new card bearing the same discounts as that of July 2, all the cards being dated Nov. 2. Boiler-tube discounts, to conform to the basis price for pipe, have not yet been issued.

In unfinished steel there is scarcely any open-market business being done. A producer has bought 12,000 tons of ingots, at a high price relatively to the price set for billets, and would buy more. Two lots of 3000 tons of billets have been sold for export, at above the set price, which does not apply on exports except in case the material is eventually for war use. Sheet and tin-plate mills are being covered by the regular sources of supply, at the set prices, but consumers without a regular source of supply have difficulty. One is inquiring for 12,000 tons for first half and has received no offers as yet.

The mills as a rule are adhering strictly to the spirit and letter of the price agreement, but occasionally an exception is found, only among the smaller interests. One small producer of bars has quoted a higher price than that set, under the guise of "preferred service." The trade, at large, hopes such attempts at evasion will disappear, as they would encourage legislative action on steel prices.

The rate of steel-ingot production this year has been about 5.5% ahead of that of last year while the rate of pig-iron production has fallen 1.4% behind. Increased steel production is largely if not wholly in plates and tin plates.

Pig Iron—There is considerable unsatisfied inquiry for bessemer and basic iron, the inquiries coming chiefly from those not regular buyers. Furnaces assert they are taking care of regular customers as well as possible, this applying particularly to foundry iron, for which the consumer usually has a regular source of supply. We quote foundry and basic at $33, malleable at $33.50 and bessemer at $36.30, f.o.b. valley furnaces, 95c. higher delivered Pittsburgh.

Ferroalloys

Ferromanganese—There is almost complete stagnation. Producers are confronted with higher costs for ore while on the other hand there is a possibility of the authorities undertaking to set a price. Prompt or forward could probably be bought at $250 but the more common quotation is $275.

Graham Furnace, Graham, Va., has been transferred to John B. Guernsey & Co., Roanoke, Va., who will run it on ferromanganese, using Brazilian ore.

Coke

Connellsville—The Fuel Administration has set prices at $6 for furnace, $7 for foundry and $7.30 for crushed, over 1-in. size. Previously there had been merely the announcement of a general price of $6, named by the President on Sept. 24, after the coke operators had recommended to the War Industries Board a price of $6.50. Although there was a general wage advance Oct. 1, the H. C. Frick Coke Co. has announced another general advance, effective Nov. 10, putting the mining rate up to $2.29, an advance of 6%, and the inside day rate up to $4.15, an advance of 28%. Labor and car supply conditions are quite unsatisfactory, and little coke is being offered in the market.

STOCK QUOTATIONS

N. Y. EXCH.†	Nov. 13
Alaska Gold M	3
Alaska Juneau	2⅛
Am.Sm.& Ref.,com.	73
Am. Sm. & Ref., pf.	101⅛
Am. Sm. Sec., pf., A	92⅛
Am. Sm. Sec., pf. B	‡96
Am. Zinc	12⅛
Am. Zinc, pf.	40
Anaconda	56⅜
Batopilas Min	1⅛
Bethlehem Steel	79⅛
Bethlehem Steel, pf.	86
Butte & Superior	16
Cerro de Pasco	31
Chile Cop	13⅛
Chino	37⅜
Colo.Fuel & Iron	32⅛
Crucible Steel	53
Dome Mines	6⅞
Federal M. & S.	12⅛
Federal M. & S., pf.	30⅞
Great Nor., ore ctf.	24⅛
Greene Cananea	35⅛
Gulf States Steel	75
Homestake	‡96
Inspiration Con.	41⅛
International Nickel	27⅛
Kennecott	30⅛
Lackawanna Steel	72
Miami Copper	27⅛
Nat'l Lead, com.	42⅛
National Lead, pf.	100⅛
Nev. Consol	17
Ontario Min	4
Quicksilver	1
Quicksilver, pf.	1⅛
Ray Con	21⅛
Republic I.&S.,com.	70⅛
Republic I. & S., pf.	90
Sloss-Sheffield	36
Tennessee C. & C.	12⅛
U. S. Steel, com	92⅛
U. S. Steel, pf	108⅜
Utah Copper	75
Va. Iron C. & C.	51

N. Y. CURB†	Nov. 13
Big Ledge	1⅛
Butte & N. Y.	.50
Butte C. & Z.	6⅛
Butte Detroit	⅛
Caledonia	.49
Calumet & Jerome	1⅛
Can. Cop. Corpn.	1⅛
Carlisle	‡4⅛
Cashboy	.03½
Con. Ariz. Sm.	1⅛
Con. Coppermines	7⅛
Con. Nev.-Utah	⅞
Emma Con	.50
First Nat. Cop	2⅛
Goldfield Con.	.41
Goldfield Merger	.03⅛
Greenmonster	⅛
Hecla Min	4⅛
Howe Sound	3⅛
Jerome Verde	⅜
Kerr Lake	4⅛
Louisiana	⅛
Magma	.33
Majestic	.28
McKinley-Dar-Sa	.58
Milford	1⅛
Mohican	‡.25
Mother Lode	.29
N. Y. & Hond	12
Nipissing Mines	7⅛
Nixon Nevada	.69
Ohio Cop	.75
Ray Hercules	‡3
Richmond	‡.56
Rochester Mines	.36
St. Joseph Lead	15⅞
Standard S. L.	⅛
Stewart	.25
Success	.13
Tonopah	4⅛
Tonopah Ex	1⅛
Tribullion	‡⅛
Troy Arizona	.14
United Cop	‡.50
United Verde Ext.	‡33½
United Zinc	‡1⅛
Utica Mines	⅛
Yukon Gold	1⅛

SAN FRAN.*	Nov. 13
Alta	.04
Andes	.11
Best & Belcher	.03
Bullion	.02
Caledonia	.10
Challenge Con	.05
Confidence	.05
Con. Virginia	.10
Gould & Curry	.02
Hale & Norcross	.03
Jacket-Cr. Pt.	.05
Mexican	.20
Occidental	.60
Ophir	.16
Overman	.04
Savage	.04
Sierra Nevada	.12
Union Con	1.27½
Utah Con	.01
Belmont	3.50
Jim Butler	.73
MacNamara	‡.21
Midway	.10
Mont.-Tonopah	.09
North Star	.04
Rescue Eula	.09
West End Con.	.63
Atlanta	.08
Booth	.03
Comb. Frac.	‡.03
D'field Daisy	‡.02
Florence	.10
Jumbo Extension	.15
Kewanas	.06
Nevada Hills	.09
Nevada Packard	.23
Round Mountain	.19
Silver Pick	08
White Caps	‡.07
Big Jim	.75
United Eastern	3.50

BOSTON EXCH.*	Nov. 13
Adventure	1⅛
Ahmeek	.83
Algomah	.25
Allouez	.51
Ariz. Com., ctfs.	9
Arnold	.25
Bonanza	.21
Butte-Balaklava	.30
Calumet & Ariz.	63
Calumet & Hecla	440
Centennial	13
Copper Range	45⅛
Daly West	1⅛
Davis-Daly	3⅛
East Butte	9⅛
Franklin	4⅛
Granby	64
Hancock	9⅛
Hedley	‡16⅛
Helvetia	.25
Indiana	1⅛
Isle Royale	24
Keweenaw	1⅛
Lake	2⅛
La Salle	2⅛
Mason Valley	4
Mass	6
Mayflower	1⅛
Michigan	1⅛
Mohawk	60⅛
New Arcadian	1⅛
New Idria	10
North Butte	13⅛
North Lake	.50
Ojibway	1⅛
Old Dominion	36
Osceola	59
Quincy	63⅛
St. Mary's M. L.	51
Santa Fe	.80
Seneca	‡6
Shannon	5⅛
Shattuck-Ariz.	19
So. Lake	1⅛
So. Utah	.12
Superior	5
Superior & Bost.	3
Trinity	4
Tuolumne	1⅛
U. S. Smelting	42⅛
U. S. Smelt'g, pf.	44
Utah Apex	2⅛
Utah Con	12⅛
Utah Metal	3⅛
Victoria	2
Winona	1
Wolverine	33
Wyandot	.50

BOSTON CURB*	Nov. 13
Alaska Mines Corp.	.12
Bingham Mines	9⅛
Boston Ely	.45
Boston & Mont.	.49
Butte & Lon'n Dev.	.10
Calaveras	1⅛
Calumet-Corbin	‡.01
Chief Con	.2
Cortez	.05
Crown Reserve	.20
Crystal Cop	.51
Eagle & Blue Bell	2
Gila Copper	17
Houghton Copper	.50
Intermountain	1⅞
Iron Cap, Com	14⅛
Iron Cap Cop., pf.	‡14
Mexican Metals	.26
Mines of America	1⅛
Mojave Tungsten	.27
Nat. Zinc & Lead	.26
Nevada-Douglas	1⅛
New Baltic	.75
New Cornelia	13⅛
Oneco	.36
Pacific Mines	‡.35
Rex Cons	.08

SALT LAKE*	Nov. 13
Bannack	.26
Big Four	.01
Cardiff	3.00
Colorado Mining	.12
Daly	1.40
Daly-Judge	8.00
Empire Copper	1.17
Gold Chain	.14
Grand Central	.55
Iron Blossom	.44
Lower Mammoth	.03
May Day	.03
Moscow	.11
Prince Con	.61
Rico Wellington	.16
Silver-King Coal'n	2.50
Silver King Con.	3.70
Sioux Con	.03
So. Hecla	1.00
Tintic Standard	1.45
Uncle Sam	.02
Wilbert	.18
Yankee	.03

TORONTO*	Nov. 13
Adanac	.11
Bailey	.04
Beaver Con	.28
Chambers Ferland	.10
Coniagas	2.95
Hargraves	.08
La Rose	.31
Peterson Lake	.08
Temiskaming	.24
Wettlaufer-Lor.	.05
Davidson	.32
Dome Exten.	.09
Dome Lake	.15
Hollinger	4.40
McIntyre	1.30
Newray	.45
Porcu. Crown	.20
Teck-Hughes	.33
Vipond	.18
West Dome	.14

STOCK QUOTATIONS—Continued

COLO. SPRINGS	Nov. 13
Cresson Con	4.75
Doctor Jack Pot	.03½
Elkton Con	.02
El Paso	.15
Gold Sovereign	.02½
Golden Cycle	1.72
Granite	.35
Isabella	.07½
Mary McKinney	.06
Portland	1.00
United Gold M	.16
Vindicator	.35

LONDON	Oct. 29		
Alaska Mexican	‡£0	5s	0d
Alaska Tre'dwell	‡ 1	0	0
Burma Corp	4	1	3
Cam & Motor	0	11	9
Camp Bird	0	8	6
El Oro	0	10	3
Esperanza	0	9	0
Mexican Mines	5	17	6
Nechi, pfd	0	11	0
Oroville	0	18	9
Santa Gert'dis.	0	15	0
Tomboy	0	20	0

* Bid prices. † Closing prices. ‡ Last Quotations.

MONTHLY AVERAGE PRICES OF METALS

Silver	New York			London		
	1915	1916	1917	1915	1916	1917
Jan.	48.855	56.775	75.630	22.731	26.900	36.682
Feb.	48.477	56.755	77.585	22.753	26.975	37.742
Mar.	50.241	57.935	73.861	23.708	27.597	36.410
April	50.250	64.415	73.875	23.709	30.662	36.963
May	49.915	74.269	74.745	23.570	35.477	37.940
June	49.034	65.024	76.971	23.267	31.060	39.065
July	47.519	62.940	79.010	22.597	30.000	40.110
Aug.	47.163	66.083	85.407	22.780	31.498	43.418
Sept.	48.680	68.515	100.740	23.591	32.584	50.920
Oct.	49.385	67.855	87.332	23.925	32.361	44.324
Nov.	51.714	71.604		25.094	34.192	
Dec.	54.971	75.765		26.373	36.410	
Year	49.684	65.661		23.675	31.315	

New York quotations cents per ounce troy, fine silver. London, pence per ounce, sterling silver, 0.925 fine.

Copper	New York		London			
	Electrolytic		Standard		Electrolytic	
	1916	1917	1916	1917	1916	1917
Jan.	24.008	28.673	88.083	131.921	116.167	142.895
Feb.	26.440	31.750	102.667	137.895	133.167	148.100
Mar.	26.310	31.481	107.714	136.750	136.000	151.000
April	27.895	27.935	124.319	133.842	137.389	147.158
May	28.625	28.788	135.457	130.000	152.522	142.000
June	26.601	29.962	112.432	130.000	137.455	142.000
July	23.865	26.620	95.119	128.409	125.500	140.409
Aug.	26.120	25.380	110.283	122.391	126.304	137.000
Sept.	26.855	25.073	113.905	117.500	134.071	135.250
Oct.	27.193	23.500	122.750	110.000	142.523	125.000
Nov.	30.625		134.659		155.432	
Dec.	31.890		145.316		162.842	
Year	27.202		116.059		138.281	

Tin	New York		London	
	1916	1917	1916	1917
January	41.825	44.175	175.548	185.813
February	42.717	51.420	181.107	198.974
March	50.741	54.388	193.606	207.443
April	51.230	55.910	199.736	220.171
May	49.125	63.173	196.511	245.114
June	42.231	62.053	179.466	242.083
July	38.510	62.570	168.357	242.181
August	38.565	62.681	169.870	243.978
September	38.830	61.542	171.345	244.038
October	41.241	61.851	179.307	247.467
November	44.109		186.932	
December	42.635		183.368	
Av. year	43.480		182.096	

Lead	New York		St. Louis		London	
	1916	1917	1916	1917	1916	1917
January	5.921	7.626	5.826	7.530	31.167	30.500
February	6.246	8.636	6.164	8.595	31.988	30.500
March	7.136	9.199	7.375	9.120	34.440	30.500
April	7.630	9.288	7.655	9.158	34.368	30.500
May	7.463	10.207	7.332	10.202	32.967	30.500
June	6.936	11.171	6.749	11.123	31.011	30.500
July	6.352	10.710	6.185	10.644	28.137	30.500
August	6.244	10.594	6.088	10.518	29.734	30.500
September	6.810	8.680	6.699	8.611	30.786	30.500
October	7.000	6.710	6.898	6.650	30.716	30.500
November	7.042		6.945		30.500	
December	7.513		7.405		30.500	
Year	6.853		6.777		31.359	

Spelter	New York		St. Louis		London	
	1916	1917	1916	1917	1916	1917
Jan.	16.915	9.619	16.745	9.449	89.810	48.329
Feb.	18.420	10.045	18.260	9.875	97.762	47.000
Mar.	16.846	10.300	16.676	10.130	95.048	47.000
April	16.695	9.459	16.525	9.289	99.056	54.632
May	14.276	9.362	14.106	9.192	94.217	54.000
June	11.752	9.371	11.582	9.201	68.591	54.000
July	8.925	8.643	8.755	8.473	50.750	54.000
Aug.	8.730	8.360	8.560	8.190	51.587	54.000
Sept.	8.990	8.136	8.820	7.966	52.095	54.000
Oct.	9.829	7.983	9.659	7.813	54.159	54.000
Nov.	11.592		11.422		56.023	
Dec.	10.665		10.495		55.842	
Year	12.804		12.634		72.071	

New York and St. Louis quotations, cents per pound. London, pounds sterling per long ton.

Pig Iron, Pgh.	Bessemer‡		Basic‡		No. 2 Foundry	
	1916	1917	1916	1917	1916	1917
January	$21.60	$35.95	$18.78	$30.95	$19.70	$30.95
February	21.16	36.37	18.93	30.95	19.51	30.95
March	21.81	37.37	19.20	33.49	19.45	35.91
April	21.65	42.23	18.95	38.90	19.45	40.06
May	21.78	46.94	19.11	42.84	19.58	43.60
June	21.95	54.22	18.95	50.05	19.34	50.14
July	21.95	57.45	18.95	53.80	19.20	53.95
August	21.95	54.17	18.95	50.37	19.22	53.95
September	22.88	46.40	19.58	42.24	19.53	48.58
October	24.61	37.25	21.26	33.95	21.51	33.95
November	30.07		28.18		26.55	
December	35.16		30.95		30.79	
Year	$23.88		$20.98		$21.15	

‡ As reported by W. P. Snyder & Co.